FACTORS INFLUENCING LIFESTYLE MODIFICATION AMONG PERSONS WITH HYPERTENSION IN PUNAKHA, BHUTAN

NIMA DORJI

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR MASTER OF NURSING SCIENCE
IN ADULT NURSING PATHWAY
FACULTY OF NURSING
BURAPHA UNIVERSITY
2020

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วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรพยาบาลศาสตรมหาบัณฑิต
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The Thesis of Nima Dorji has been approved by the examining committee to be partial fulfillment of the requirements for the Master of Nursing Science in Adult Nursing Pathway of Burapha University

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Integration of lifestyle modification with modern medicine is recommended management of hypertension. This study aimed to describe lifestyle modification and explore factors predicting lifestyle modification among persons with hypertension in Punakha, Bhutan. Individual and family self-management theory guided this study. Simple random sampling technique was used to recruit 108 persons with hypertension visiting non-communicable disease unit of Punakha District Hospital, Bhutan. Research instruments consisted of demographic record form, Hypertension Self-care Profile Behavior Scale, Hypertension Knowledge-Level Scale, Belief About Medicine Questionnaire, Hypertension Self-Efficacy Scale and Multi-diminensional Scale of Perceived Social Support each bearing reliability coefficient of .83, .82, .91, .81 and .85 respectively. Data was analyzed using descriptive statistics and standard multiple regression.

The result showed the mean score and standard deviation of lifestyle modification among the participants was 53.9 and 7.7 respectively. Standard multiple regression revealed hypertension knowledge (β = .19, p = .04) and perceived self-efficacy (β = .36, p < .001) as the significant predictor of lifestyle modification. Perceived social support did not predict lifestyle modification. All predictors explained 21.05% of variance in lifestyle modification (Adjusted R^2 = .21, $F_{(4, 103)}$ = 10.51, p < .001) among the participants.

The result indicates that lifestyle modification can be enhanced by designing intervention directed toward strengthening hypertension knowledge and perceived self-efficacy. While providing interventional program, healthcare

professional should involve both individual and family to motivate them in promotion of lifestyle modification.

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Nima Dorji

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CHAPTER 1
INTRODUCTION

Background and significance of problem

Hypertension is serious public health issue devastating millions of lives across the world. It is defined as the persistent elevation of seated blood pressure of ≥140/90 mmHg measured on two or more separate occasions (JNC 7, 2003; WHO, 2016). Worldwide prevalence of hypertension is soaring; the number of cases rose from 594 million in 1975 to 1.13 billion in 2015, majority (two third) of which are from low and middle income countries (WHO, 2019a). Globally, uncontrolled systolic blood pressure alone is responsible for 10.4 million deaths and 218 million disability adjusted life years (Collaborators, 2018). Ischemic heart diseases and the stroke which are the most common complications of hypertension accounted for combined death tolls of 15.2 million in 2016 (WHO, 2018a).

Such significant rise in hypertension-related morbidity and mortality are mainly due to unhealthy lifestyle practices which include unhealthy diet, physical inactivity, heavy alcohol consumption, smoking, non-adherence to prescribed medication and psychological stress among hypertensive population (Spruill & Colleagues, 2019; Tripathy & Colleagues, 2017; JNC 7, 2003). For instance, hypertension is highly prevalent among heavy alcohol drinkers (54.4%) and those who consume more than 5gm of salt per day (40.7%) (Tripathy et al., 2017). It is evident that blood pressure control with antihypertensive medication is inadequate among those with weight gain (OR = 2.18; 95% CI: 1.52-3.11; $p < .001$), physical inactivity (OR = 1.19; 95% CI: 1.17-3.38, $p = .01$), and high intake of salt (OR = 1.46, 95% CI: 1.02-2.07, $p = .03$) (Yang et al., 2017). Study also reveals that smoking increases systolic blood pressure by 4 mmHg and diastolic blood pressure by 3 mmHg (Alsaigh, Alanazi, & Alkahtani, 2018). In addition, 91.8% of those who didn't adhere to prescribed medication was associated with uncontrolled blood pressure (Adidja et al., 2018) while 38.2% of those with psychological stress were reported to have raised blood pressure (Spruill et al, 2019).

Bhutan, a small nation in the South Asia is also bearing the brunt of enormous socio-economic burden imposed by non-communicable disease which includes hypertension. Evidence reveals that non-communicable diseases accounted for 69% of the total deaths in Bhutan (WHO, 2018b). Prevalence of hypertensive cases doubled from 16% in 2012 (National Health Survey, 2012) to 35.6 % in 2014 (Ministry of Health, 2015) giving rise to a number of life-threatening health issues including stroke, myocardial infarction and chronic kidney diseases in the country (Ministry of Health, 2018; Wangdi, 2013). It is interesting to note that increase in incidence of hypertension is associated with corresponding rise in incidence of stroke in Bhutan (Ministry of Health, 2018; Ministry of Health, 2019).

Lifestyle which is embedded within its unique values, culture and tradition might have played a role in rising number of hypertension in Bhutan. For instance consumption of alcohol is considered as socially accepted norm (Dorji & Dorji, 2005) while smoking is considered as unwholesome and sinful. While people's engagement in prayers and meditation (Dorji & Dorji, 2005) might have buffered the effect of psychological stress (Innes, Selfe, Brown, Rose, & Thompson-Heisterman, 2012), traditional national dishes of Bhutan which are rich in carbohydrate, fats and excessive salt (Wangdi, 2013) might have adversely impacted the health of population. Thus viewing through the lens of unique Bhutanese lifestyle, it is probable that persons with hypertension in Bhutan are at increased risks of developing dreadful complications related to uncontrolled blood pressure. Therefore, lifestyle modification must be encouraged and promoted among persons with hypertension to prevent untoward complications.

Lifestyle modification refers to adoption of healthy lifestyles such as ingestion of healthy diet, physical activity, weight reduction, moderation in alcohol consumption, cessation of smoking, adherence to prescribed medication and stress management (JNC 7, 2003; Kasper & Colleagues, 2018). Although much is not known on how non-adherence to lifestyle modification is affecting the persons with hypertension in Bhutan, it is evident that majority of the populations in general are non-compliance to it. The study shows that 22% of adult population in general were physically inactive, 42.4% were current alcohol drinkers, 6% were obese, consumption of fruits and vegetable was low, more than 50% of population did not

engage in vigorious physical activity, 9% of adult had raised blood sugar and 88.1% with high blood pressure of ≥ 140/90 mmHg were not on antihypertensive medication (Ministry of Health, 2015). Likewise the prevalence of high salt intake, unhealthy diet and consumption of tobacco were 99%, 67% and 25% respectively among the general adult population in Bhutan (Pelzom, Isaakidis, Oo, Gurung & Yangchen, 2017).

While non-adherence to lifestyle modification is known to result in catastrophic health consequences, adoption of comprehensive lifestyle modification is found to control blood pressure and prevent complications among the persons with hypertension. Adoption of Dietary Approach to Stop Hypetension diet (DASH diet) for instance is associated with 11 mmHg and 3 mmHg reduction in blood pressure for hypertensive and non-hypertensive cases respectively (Whelton et al., 2018). It is also evident that engagement in regular physical activity such as exercise is associated with reduction of 7-10 mmHg and 4-8 mmHg of systolic and diastolic blood pressure respectively ; weight reduction of 5.1kg was associated with 4.4 mmHg of systolic and 3.6 mmHg of diastolic blood pressure (Bruno, Amaradio, Pricoco, Marino, & Bruno, 2018). While the consumption of alcohol has deleterious impact on health, abstinence or moderation in alcohol intake is associated with prevention of millions of death secondary to hypertension and cardiovascular diseases (WHO, 2019a; Santana et al., 2018). Smoking cessation is another important lifestyle modifications that can be adopted to barricade against rising burden of hypertension (Bhise & Patra, 2018).

Despite immense benefits attached to adoption of lifestyle modification in lowering adverse events associated with hypertension, the body of evidences demonstrate that level of practice is pathetically unsatisfactory among the persons with hypertension. Number of studies unveil that adherence to lifestyle modification ranges from 15.6% to 23% among hypertensive populations (Tibebu, Mengistu, & Negesa, 2017; Alefan, Huwari, Alshogran, & Jarrah, 2019; Giena, Thongpat, & Nitirat, 2018) which is low. Even in Bhutan, majority of adult populations are not following recommended lifestyle modification thus exposing themselves to a number of risk factors for hypertension (Pelzom, Isaakidis, Oo, Gurung & Yangchen, 2017; Ministry of Health, 2015).

Lifestyle modification is an outcome of self-management process. Myriads of factors are involved in modulating individual's engagement in lifestyle

modification. According to individual and family self-management theory (Ryan & Sawin, 2009), proximal outcome which corresponds to lifestyle modification is primarily influenced by the factors in self-management process. As reflected in this theory, literatures indicate that factors embedded in self-management process such as knowledge and belief, self-efficacy and social support which corresponds to hypertension knowledge, belief about medicine, perceived self-efficacy and perceived social support in the present study are reported to predict lifestyle modification among persons with hypertension (Tibebu, Mengistu, & Negesa, 2017; Okwuonu, Emmanuel, & Ojimadu, 2014; Sheilini et al, 2018; Kim and Kong, 2015; Giena,Thongpat, & Nitirat, 2018).

Hypertension knowledge plays major role in modulation of lifestyle modification among hypertensive population. It impact lifestyle modification by influencing behavior specific self-efficacy, outcome expectancy and goal congruence (Ryan & Sawin, 2009). Empirical evidence demonstrated that high level of knowledge is positively associated with better compliance to lifestyle modification (β = .21; p < .001) (Jankowska-Polańska, Uchmanowicz, Dudek, & Mazur, 2016). Similar study reports that those respondents with adequate hypertension knowledge were 2.9 times more likely to exhibit compliance to lifestyle modification compared to those with low hypertension knowledge (Akoko, Fon, Ngu, Ngu, & Ngu, 2016). Owing to the lack of literature, impact of hypertension knowledge on lifestyle modification among the patients with hypertension remain unknown in Bhutan.

Adhrence to lifestyle modification is also influenced by individual's belief about medicine. Belief about medicine refers to the patient's attitude toward taking medication, description of wants and concerns, understandings, beliefs and behaviors (Niriayo & Colleagues, 2019). According to Ryan & Sawin (2009), individuals are more likely to engage in lifestyle modification if they embrace health beliefs which is consistent with behavior. It is also hypothesized that belief about medicine influences lifestyle modification by impacting behavior specific self-efficacy, outcome expectancy and goal congruence (Ryan & Sawin, 2009). The study demonstrates that adherence to medication is influenced by individual's belief about medicine (Alefan, Huwari, Alshogran, & Jarrah, 2019); those participants who harbour negative belief on medicine are less likely to adhere to lifestyle modification and medication regimen

compared to those with positive belief (Niriayo et al, 2019). While higher negative beliefs toward medicine is associated with low adherence to medication (β = -.46) (Lemay, Waheedi, Al-Sharqawi, & Bayoud, 2018) higher necessity beliefs is positively associated with medication adherence (r = .32, 95% CI: .21-.43) (Nie, Chapman, Chen, Wang, & Wei, 2019). Further, a strong association was reported between positive belief about medicine and adherence to antihypertensive drugs (AOR=5.49 95% CI: 0.24-126.04, p .28) (Akoko et al, 2016).

In Bhutan, majority of people still hold on superstitious belief that illness result due to possession of spirit or annoyance of local deity. Because of prevalence of such belief, it is apparent that a people with chronic illness still seek treatments from traditional local healers like shaman (Dorji & Dorji, 2005) which could negatively influence patient's compliance to treatment and medical recommendations. In addition, people also possess false belief that ingestion of antihypertensive medication can cause kidney failure which could be the probable reason why large number (88.1%) of the adults with high blood pressure were not on antihypertensive medication (Ministry of Health, 2015). Since myths and orthodox beliefs are ubiquitous among Bhutanese populations (Thinley et al, 2017), it is essential to investigate how such belief about medicine influence lifestyle modification among persons with hypertension.

Similarly, perceived self-efficacy is known to influence lifestyle modification among the individuals with chronic illness. Self-efficacy refers to judgment of personal capability to organize and execute a health promoting behavior such as lifestyle modification (Pender, Murdaugh & Parsons, 2015). According to Ryan and Sawin (2009) it is hypothesized that self-efficacy directly influences individual's engagment in healthful behavior by impacting their way of thinking, feeling, motivation and action. A number of empirical evidences support this hypothesis. Self-efficacy was reported as the strongest predictor of lifestyle modification (β = .32, p < .001) among hypertensive populations in Indonesia (Giena,Thongpat, & Nitirat, 2018). Similar study in Ethiopia demonstrates that those participants with good self-efficacy were 2.6 times more likely to adhere to low salt diet and 3.5 times more likely to engage in weight management compared to those with low self-efficacy (Labata, Ahmed, Mekonen, & Daba, 2017).

Perceived social support is found to exert direct or indirect influence in regulation of lifestyle modification among individuals (Pender, Murdaugh & Parsons, 2015). Perceived social support include provision of emotional, instrumental or informational support from family and healthcare providers (Ryan & Sawin, 2009). Evidence shows that those with high social support were 2.9 times more likely to engage in healthy lifestyle compared to those without social support (Ademe, Aga, & Gela, 2019). A study, by Kumar (2015) also revealed positive correlation between perceived social support and lifestyle modification ($r = .27$, $p < .05$). Further, it was observed that perceived social support predicted 15.10% of variance in self-management behavior among the cohort of hypertensive patients ($\beta = .368$, $p < .001$) (Jandeekaewsakul, Watthayu, & Suwonnaroop, 2018). In Bhutan, prevalence of joint family guarantees provision of physical, social, spiritual, psychological and economic support among the members of the family (Leaming, 2004). Of note, there is presence of strong social bond among the people in Bhutan. This excellent social network within the family and community level ensures great deal of cooperation, collaboration and unwavering support among the people. However, it is not fully understood how social support influence lifestyle modification among persons with hypertension in Bhutan.

In conclusion huge body of empirical evidences show that lifestyle modification is highly efficacious in controlling raised blood pressure among hypertensive patients. In fact, even antihypertensive medications were found to be futile in controlling elevated blood pressure if comprehensive lifestyle modification is not adopted by the patients. Factors such as hypertension knowledge, belief about medicine, perceived self-efficacy and perceived social support were shown to predict lifestyle modification among hypertensive populations across the world. However, there is substantial lack of literature focusing on influence of aforesaid predicting variables on lifestyle modification among persons with hypertension in Bhutan. In addition, since the way of Bhutanese life is interwoven within its unique culture, traditions, values and beliefs, findings from other countries may not be generalizable to its population. Moreover, as per the annual medical record maintained by Punakha District Hospital, there were increasing numbers of hypertension-related complications such as stroke every year. Conducting study in this setting will help

understand influence of such factors in lifestyle modification among persons with hypertension so that appropriate intervention can be devised to minimize complications related to hypertension. Therefore, it is essential to investigate and find out the factors predicting lifestyle modification among the persons with hypertension in Punakha, Bhutan.

Objectives of the study

1. To describe lifestyle modification among persons with hypertension in Punakha, Bhutan.
2. To examine whether hypertension knowledge, belief about medicine, perceived self-efficacy and perceived social support can predict lifestyle modification among persons with hypertension in Punakha, Bhutan.

Research hypothesis

Hypertension knowledge, belief about medicine, perceived self-efficacy, and perceived social support can predict lifestyle modification among persons with hypertension in Punakha, Bhutan.

Scope of the study

This study was conducted in the months of March and April 2020, to describe lifestyle modification and to examine predictors of lifestyle modification among persons with hypertension attending NCD clinic at Punakha District Hospital in Bhutan.

Conceptual framework

Individual and family self-management theory propounded by Ryan & Sawin (2009) was used as the guiding theoretical framework in this research. The main objective of the study was to examine lifestyle modification among persons with hypertension in Punakha, Bhutan. Lifestyle modification includes ingestion of healthy diet, physical activity, weight reduction, moderation in alcohol consumption, cessation of smoking and adherence to prescribed medication which must be

embraced for optimization of blood pressure control among persons with hypertension.

According to individual and family self-management theory, individual's engagement in recommended health behavior such as lifestyle modification represents primary outcome of self-management. This primary outcome known as proximal outcome is influenced by the elements in the contextual and process dimension. Described as risk and protective factors, the elements in contextual dimensions such as condition specific factors, physical and social environment, an individual and family factors challenge or promote individuals and families engagement in lifestyle modification either directly or indirectly by impacting process dimensions.

Factors in process dimension such as knowledge, belief, self-efficacy and social support which corresponds to hypertension knowledge, belief about medicine, perceived self-efficacy and perceived social support in the current study directly influences outcome - the lifestyle modification. Hypertensive knowledge influences lifestyle modification by impacting behavior specific self-efficacy, outcome expectancy and goal congruence. Belief about medicine follows the same mechanism to that of hypertension knowledge in influencing lifestyle modification. Similarly, perceived self-efficacy enhances lifestyle modification by eliminating perceived barriers to action and increasing individual's commitment to the plan of action (Pender, Murdaugh & Parsons, 2015). Perceived social support from family, friends and significant others promote engagment in lifestyle modification by buffering the effects of stress and offering the sense of encouragement (Reblin & Uchino, 2008). Following research framework illustrates relationship between predicting variables and outcome variable.

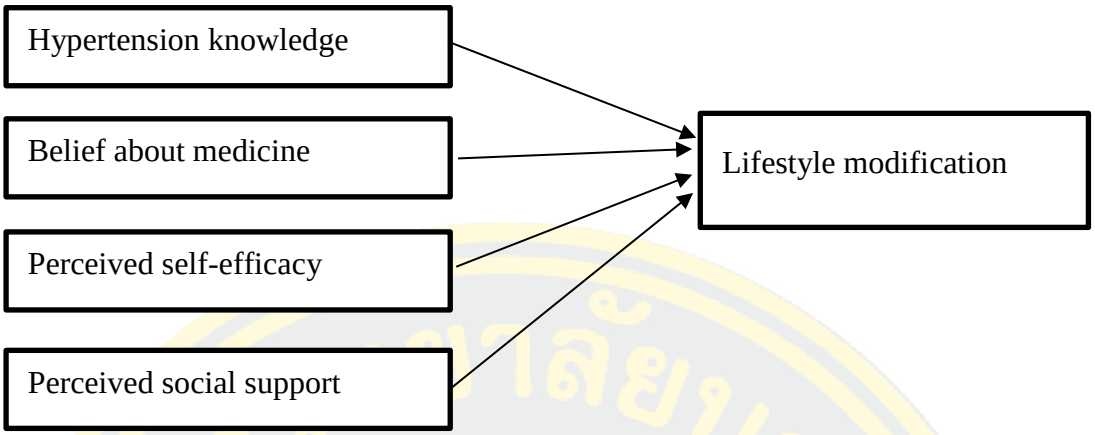

Figure 1 Research framework

Definition of terms

Persons with hypertension

Persons with hypertension are those individuals diagnosed with essential hypertension by a physician based on the mean of two or more seated blood pressure reading of ≥140/90 mmHg on two or more separate occasions or taking blood pressure lowering agents.

Lifestyle modification

Lifestyle modification refers to action that persons with hypertension must undertake to control blood pressure and to prevent or delay complications. It comprises ingestion of healthy diet, physical activity, weight reduction, moderation in alcohol consumption, cessation of smoking, adherence to prescribed medication and stress management. Lifestyle modification practice was measured by Hypertension Self-Care Profile Behavior Scale (HBP SCP-Behavior scale) developed by Han, Lee, Commodore-Mensah and Kim (2014).

Hypertension knowledge

Hypertensive knowledge is defined as an ability of persons with hypertension to understand factual information about hypertension such as definition of hypertension, etiology, medical treatment and complication of hypertension, as well as attitude and behavior about drug compliance, diet and lifestyle. Hypertension knowledge was measured by Hypertension Knowledge-Level Scale (HK-LS) developed by Erkoc, Isikli, Metintas and Kalyoncu (2012).

Belief about medicine

Belief about medicine refers to persons with hypertension's attitude toward taking medication, description of wants and concerns, understandings, beliefs and behaviors which was measured by Belief About Medicine Questionnaire (BMQ) developed by Horne, Weinman and Hankins (1999).

Perceived self-efficacy

Perceived self-efficacy refers to degree of confidence that the persons with hypertension has in his or her ability to participate in a given activities. It was measured by Hypertension Self-Efficacy Scale developed by Warren-Findlow and Colleagues (2018).

Perceived social support

Perceived social support refers to perception of persons with hypertension related to instrumental, informational and emotional support received from family, friends and significant others. It was measured by Multidimensional Scale of Perceived Social Support (MSPSS) developed by Zimet, Dahlem, Zimet and Farley (1988).

CHAPTER 2
REVIEW OF LITERATURE

This chapter presents overview of hypertension, individual and family self-management theory, lifestyle modification and the factors influencing lifestyle modification among persons with hypertension and summary as outlined below:

1. Overview of hypertension
   - 1.1 Definition of hypertension
   - 1.2 Risk factors of hypertension
   - 1.3 Classification of hypertension
   - 1.4 Pathogenesis of primary hypertension
   - 1.5 Impacts of hypertension
   - 1.6 Management of hypertension
2. Lifestyle among hypertensive population in Bhutan
3. Individual and family self-management theory
4. Factors influencing lifestyle modification
   - 4.1 Hypertension knowledge
   - 4.2 Belief about medicine
   - 4.3 Perceived self-efficacy
   - 4.4 Perceived social support
5. Summary

Overview of hypertension

Hypertension is one the most common non-communicable diseases affecting tens of thousands of people worldwide. The number of people diagnosed with systolic blood pressure greater than or equal to 140 mmHg peaked from 442 million in 1990 to 874 million in 2015 which accounted for 14% of deaths and 143 million disability-adjusted life years (Forouzanfar et al., 2017). Worldwide prevalence of hypertension was 31% corresponding to 1.39 billion persons in 2010 with lofty prevalence observed among low and middle income countries (Bloch, 2016). It is estimated that high blood pressure account for one in eight deaths making it third leading causes of

mortality in the world (Singh & Loscalzo, 2019). Even in Bhutan, incidence and prevalence of hypertension has been increasing over the years leading to significant morbidity and mortality resulting from uncontrolled blood pressure (Ministry of Health, 2015; Ministry of Health, 2018).

1. Definition of Hypertension

Blood pressure represents the force exerted by the blood against the wall of the arteries as it is pumped out of the heart; and when the pressure against the arterial wall remains persistently raised, it is called hypertension (Wilcken, 2015). While normal adult blood pressure is defined as the systolic pressure of < 120 mmHg and diastolic blood pressure of < 80 mmHg, hypertension in adult is defined as persistent elevation of seated blood pressure of ≥ 140/90 mmHg measured on two or more separate occasions (JNC 7, 2003; WHO, 2019a)**.** According to Whelton and Colleagues (2017), blood pressure is staged as:

Normal blood pressure: systolic blood pressure (SBP) < 120 mmHg and diastolic blood pressure (DBP) < 80 mmHg.

Elevated: SBP of > 120-129 mmHg & DBP < 80 mmHg

Hypertension stage 1: SBP of 130-139 mmHg or DBP: 80-89 mmHg.

Hypertension stage 2: SBP ≥ 140 mmHg or DBP ≥ 90 mmHg.

Recommended target blood pressures for different age group are as follows: less than 150/90 mmHg for those who are 60 years or greater, less than 140/90 mmHg for those who are younger than 60 years and less than 140/90 mmHg for those older than 18 years of age with either chronic kidney disease or diabetes (JNC 8, 2014)

2. Risk factors of hypertension

Key risk factors implicated for hypertension include modifiable risk factors and non-modifiable risk factors. Modifiable risk factors include obesity, unhealthy diet, alcohol consumption, smoking and psychological stress while non-modifiable risk factors comprise genetics, age, gender, and race (Grossman & Porth, 2014).

2.1 Obesity

According to Center for Disease Control and Prevention [CDC], obesity is a clinical condition in which there is an excessive accumulation of fat defined by body mass index of ≥ 30 kg/m^2 (CDC, 2016). Strong positive association is observed between obesity and hypertension. For instance twofold increase in blood pressure

was reported among those subjects who are obesed compared to non-obesed participants (AOR= 2.24, 95%CI:1.89-2.65) (El Bcheraoui et al., 2014). Similarly, a cross-sectional study in India demonstrates three-folds increased in blood pressure among the obesed participants (OR = 3.57) compared to non-obesed participants (Singh, Shankar, & Singh, 2017). In United States, it is estimated that 30% of the hypertensive cases were attributable to obesity (Le & Colleagues, 2014). In recently published clinical guideline developed by American College of Cardiology Foundation and American Heart Association, it was documented that obesity was responsible for 40% of hypertension cases (Whelton et al., 2018).

2.2 Unhealthy diet

Unhealthy diets which comprises high amount of salt, fat and sugar with insufficient amount of fruits and vegetable is implicated for elevation of blood pressure (WHO, 2019a). STEPS survey in India shows that incidence of hypertension is 40.7% for those subjects who consume ≥ 5 gm of salt compared to those who consume less (Tripathy, Thakur, Jeet, Chawla, & Jain, 2017). Evidence also shows that diet which is low in potassium is linked to high blood pressure (Whelton et al., 2018). In contrast, reduction of salt intake of less than 5 gram per day is estimated to prevent 1.7 million deaths each year (WHO, 2020). The World Health Organization (2020) report also highlights how consumption of sugar and saturated fat in excessive amount is linked to overweight or obesity which raises blood pressure.

2.3 Alcohol consumption

Ingestion of alcohol in excessive amount increases blood pressure by diminishing baro-receptor reflex, stimulating central and peripheral nervous system, activating sympathetic nervous system, stimulating renin-angiotensin-aldosterone system and by raising level of plasma cortisol (Husain, Ansari, & Ferder, 2014). The cross-sectional survey show that prevalence rate of hypertension among alcohol drinkers among the Indian population was 54.4% (Tripathy et al., 2017). In United State it was reported that alcohol accounted for almost 10% of population burden of hypertension (Whelton et al., 2018).

2.4 Smoking

Use of tobacco in any form is deadly and is responsible for 8 million deaths per day across the world (WHO, 2019b). Though impact of smoking to blood

pressure is complex, there are well established data to show that both active and passive smoking is associated with rise in blood pressure mainly through activation of sympathetic nervous system. A study reported that odd of having high blood pressure is higher among the smokers with adjusted odd ratio of 1.15 (Nguyen, Bauman, & Ding, 2019) indicating smoking as one of the key risk factors of hypertension.

2.5 Psychological stress

Psychological stress arises from variety of etiologies and situations which is unique for every individual. Psychological stress is known to be one of the factors implicated for hypertension. Dar and Colleagues (2019) demonstrate the mechanism by which psychological stress increases blood pressure. According to the authors, psychological stress activates stress response system such as sympathetic nervous system resulting in release of catecholamine. The catecholamine so released is responsible for elevating blood pressure. In addition, activation of sympathetic nervous system is found to release cortisol which increases blood pressure.

2.6 Genetic factors

Hypertension is polygenic phenomena which is influenced by a large of number of genes or combination of genes; genetic variants implicated for elevated blood pressure comprises 25 rare mutations and 120 single-nucleotide polymorphisms (Whelton et al., 2018). Despite discovery of several single-nucleotide polymorphisms impacting regulation in blood pressure, it was found that the effect of associated variants on rise in blood pressure was small. Thus it was concluded that the presence of large number of small-effects alleles linked with hypertension leads to rapid rise in blood pressure.

2.7 Age

As one advances in age, there is concomitant rise in blood pressure due to physiological changes taking place in the body. A national survey in Saudi Arabia in 2013 reported that prevalence of hypertension increases with age (AOR =1.07; 95%CI :1.06-1.08) (El Bcheraoui et al., 2013). Recent survey in India also shows that incidence of hypertension is significantly higher (59.7%) among the age group of 45-69 years (Tripathy et al., 2017) indicating strong association between aging and blood pressure.

2.8 Gender

Significant disparity in risk of developing hypertension were observed between a male and female subjects in many of the studies where male is more prone for hypertension than female (El Bcheraoui et al., 2013; Singh, Shankar & Singh, 2017). Tripathy et, al (2017) also indicates that hypertension is more prevalent among male gender compared to their female counterpart. This disparity could be mainly due to adoption of comprehensive lifestyle modification among female compared to their male counterpart (Everett & Zajacova, 2015).

2.9 Race

Ample of evidences show variation in prevalence of hypertension among the races wherein more number of blacks are diagnosed with high blood pressure compared to other ethnic group (Whelton et al., 2018). According to statistical fact sheet of American Heart Association and American Stroke Association (2013), the prevalence rate of high blood pressure was more than 40% for non-Hispanic black while the same was less than 34% for other races. As documented in the Whelton et al, (2018) 40 years risk of being diagnosed with hypertension for normotensive adult aged 45 years was 93% for African American, 92% for Hispanics, 86% for whites and 84% for Chinese adult.

3. Classification of hypertension

Broadly, hypertension is classified into primary and secondary hypertension. Primary hypertension is the commonly prevalent hypertension accounting for 90 to 95 of the total cases (Singh & Loscalzo, 2019). Also known as essential hypertension, there is no specific etiological factors for primary hypertension. However, various environmental and genetics factors are implicated for this occurrence. Pathological underpinnings of primary hypertension is mainly due to interaction between genetics and environmental factors (Carey, Muntner, Bosworth, & Whelton, 2018).

In contrast to essential hypertension, secondary hypertension result from identifiable etiological factors (Grossman & Porth, 2014) and accounts for 5 to 10% of the cases (Tziomalos, 2019). The most common causes include intrinsic renal disease, renovascular disease and aldosteronism among others (Singh & Loscalzo, 2019). Recognition of the causative factors and management of the same may result in

normalization of blood pressure without administering antihypertensive medications (Tziomalos, 2019).

4. Pathogenesis of primary hypertension

Hypertension is the end result of increased cardiac output or total peripheral resistance or both (Mccance & Huether, 2014). Pathophysiological basis of hypertension in this study will mainly focus on interactive role of genes and environment; and the influence of sympathetic nervous system on blood pressure as described by Mccance and Huether (2014). Genetic factors in combination with environmental factors results in malfunctioning of neurohumoral system which encompasses sympathetic nervous system, renin-angiotensin-aldosterone system, adducin & natriuretic hormones, inflammation and insulin resistance. Dysfunction in neurohumoral system and insulin resistance synergistically contribute in uninterrupted systemic vasoconstriction and escalation in peripheral resistance. Inflammatory changes coupled with alteration in neurohumoral system results in retention of salt and water by the kidney which consequently increases blood volume. Rise in blood volume and increase in peripheral resistance are the two primary causes of sustained hypertension. Likewise, production of catecholamine causes over-activity of the sympathetic nervous systems resulting in elevation of heart rate, peripheral resistance and remodeling of vascular system. Remodeled arterial vessels ultimately undergo narrowing and vasospasm. Sympathetic nervous system also contributes to vasospasm by increasing insulin resistance and by its procoagulant effects. All these mechanisms result in sustained increase in blood pressure.

Hypertension is associated with number of catastrophic consequences and complications. Of all the complications, uncontrolled hypertension can gravely damage the heart by hardening the arteries resulting in diminished blood flow and oxygen supply to the heart (WHO, 2019a). As per WHO, raised blood pressure and reduced blood flow can give rise to angina, heart attack, heart failure, stroke, blindness and kidney failure. Specific complication related to target organ such as heart, brain, eye and kidney are briefly described under the following headings:

4.1 Cardiac complication

In long run, hypertension is responsible for development of congestive heart disease in which there is reduced blood flow to the myocardium resulting in

angina, myocardial infarction and congestive heart failure (Linton, 2016). Globally, out of 17 million deaths resulting from cardiovascular disease, 9.4 million deaths are due to complication of hypertension (WHO, 2013). A meta-analysis involving 844 studies from 154 countries reported that 41% of mortality linked to systolic blood pressure of ≥ 140 mmHg were related to cardiovascular deaths (95% UI, 35.9%-45.4%) while the rest were through chronic renal disease (Forouzanfar et al., 2017). This report also demonstrate that ischemic heart disease was the significant contributor of death at all level of systolic blood pressure with 4.9 million deaths (95% UI, 4.0-5.7 million).

4.2 Renal complication

Hypertension is the key factor responsible for kidney injury manifested by macro-albuminuria or micro-albuminuria (Kasper et al., 2018). As per the author, atherosclerotic vascular lesion in the kidney related to uncontrolled hypertension mainly affect preglomerular arterioles culminating in glomerular and post-glomerular ischemia. Injury to glomeruli can also occur due to direct damage to glomerular capillaries as a consequences of glomerular hyper-perfusion. If hypertension is not controlled, there will be progressive injury and irreversible damage to nephron leading to end-stage renal disease. The evidence demonstrate that hypertension is the second leading cause of end-stage renal disease accounting for 34% of cases in United States (Whelton et al., 2018).

4.3 Cerebrovascular complications

Stroke is the second leading causes of death in the world accounting for 5 million deaths a year and the strongest risk factor for stroke is elevated blood pressure (Kasper et al., 2018). Narrowing of arteries and/or rupture of the arteries supplying blood to the brain caused by elevated blood pressure is the main mechanism that result in stroke. Hypertension is known to be the main culprit for both ischemic and hemorrhagic stroke and the risk for stroke increases by two-fold with each 7.5 mmHg rise in diastolic blood pressure (Markus, 2016). A systematic review and meta-analysis of RCT showed that blood pressure reduction is associated with corresponding decrease in recurrent cerebrovascular event or disabling fatal stroke (Katsanos et al, 2017). Complementary to this, treatment of hypertensive and

prehypertensive cases with antihypertensive agents reduces the risk of stroke by 32% and 22% respectively compared to those on placebo (Kasper & Colleagues, 2019).

4.4 Hypertensive retinopathy

Constantly elevated blood pressure can damage retina of the eye and can result in condition known as hypertensive retinopathy (Narasimhan, Neha, & Vijayarekha, 2012). According to authors, hypertensive retinopathy occurs when the blood vessels supplying blood to the retina is damaged due to abnormally elevated blood pressure. It is characterized by double vision, headache and loss of vision. If not treated on time hypertensive retinopathy can result in permanent blindness.

4.5 Peripheral vascular complications

Chronically elevated blood pressure is the major factor for atherosclerotic diseases of vascular system which in turn predominantly contributes to stroke, heart disease and kidney failure(Kasper et al., 2018). As per Kasper et al, hypertensive patients affected with arterial disease of lower extremities are at elevated risk for development of cardiovascular diseases.

5. Impacts of hypertension

Hypertension is leading cause of premature morbidity and mortality worldwide. If appropriate measures are not taken to control blood pressure, it will culminate in devastation of individual, family and health system.

At the individual level, hypertension results in number of complications and reduction in health-related quality of life. Since hypertension is rarely accompanied by visible signs and symptoms, it is known only when the dreadful complications such as stroke, heart failure, chronic kidney diseases and heart attack begins to take tolls on the lives of individuals (Bloch, & Basile, 2018; WHO, 2013). A systematic analysis of Global Burden of Diseases 2017 reported that high systolic blood pressure was the leading risk factors, accounting for 10.4 million deaths and 218 milliion disability adjusted life years (DALY) (Collaborators, 2018). Lifetime risk of developing cardiovascular disease is 63.3% for those participants with baseline hypetension while it is only 46.1% risk for those with normal baseline blood pressure (Wilson, 2018). Hypertension is also known to adversely impact health-related quality of life as it requires lifelong medication intake and strict lifestyle modification (Xiao, Zhang & Long, 2019). A study involving 333 adults populations subgrouped into

hypertensive and normotensive samples reported that hypertensive patients were found to have worse health-related quality of life compared to normotensive populations (Carvalho, Siqueira, Sousa, & Jardim, 2013). Likewise, hypertension financially hits the pocket of the patients as they have to bear certain proportion of the healthcare expenses (Arredondo & Avilés, 2014). Similarly, the following findings of international survey portrays adverse undersirable consequences of hypertension as reported by the patients: negative impact on their jobs 85%, reduction of household income 73%, feeling isolated 55% and feeling frustrated 35% (Europe, 2018).

Affliction of an individual with hypertension also have deleterious physical, emotional, economical and psychological impact for the family (Verma, 2016; Xiaos, Zhang & Long, 2019). Premature morbidity and disability culminating from hypertension limits patient's capability in executing normal roles and responsiblities giving rise to physical burden of the family members (Xiaos, Zhang & Long, 2019). Evidence shows that family members were actively involved in ensuring that patient takes antihypertensive medicine on time, accompanying patients to healthcare institution, and encouraging and empowering patients in adhering to lifestyle modification which significantly increases their physical and psychological stress (Pulmonary Aterial Hypertension Association, 2013; Verma, 2016). Caring of the patient with major complications of hypertension such as stroke demands dedicated caregiver which causes disruption in family process, conflicting demand in caregiving and professional career, substantial loss of income and diminished productivity at a work (Pulmonary Arterial Hypertension Associaton, 2013). Further a study showed that 57% of family caregivers of pulmonary hypertension patients had disrupted daily lives, 29% were affected with their jobs and 25% were stressed up (Europe, 2018).

Therefore, if prudent action is not taken to control incidences of hypertension, it has the enormous potential to annihilate health system. Because of its tremendous economic implications, hypertension is branded as the costliest disease in the world with $131 billion spent annually for treatment and management of hypertension and its complications in United States (Kirkland et al, 2018). A population-based cohort study in Canada reported that hypertension-attributable cost in 2010 was estimated to be $13.9 billion and the forecasted cost for the same in 2020 was $20.5 billion (Weaver et al., 2015). In Bhutan, where the healthcare is free of

cost, government is spending millions of ngaltrum (Bhutan currency) for referral of cases abroad like end-stage renal failure, heart failure and myocardial infarction which are major sequela of hypertension (Thinley et al, 2017). It is also noteworthy to mention here that 20-30% of Bhutan's healthcare budget is allocated for procurements of drugs, major portions of which are related to management of chronic illness like hypertension (Adhikari, 2016). To control rising cost of healthcare expenditure related to hypertension and its complication, it is important to incorporate lifestyle modification as adjunct therapy with antihypertensive medications for effective management of hypertension.

6. Management of hypertension

The ultimate goal of managing hypertension is to control blood pressure and to prevent complications. However, not every cases of hypertension warrants treatment with blood pressure lowering agents. The antihypertensive medication is recommended for those individuals with uncontrolled blood pressure despite lifestyle changes and are at risk of developing cardiovascular complications (JNC 8, 2014). According to Joint National Committee 7 (2003), management of hypertension include pharmacological and non-pharmacological such as lifestyle modification.

6.1 Pharmacological management

Pharmacological management of hypertension comprises ingestion of prescribed drugs. Based on the mechanism of actions involved in lowering blood pressure, antihypertensive medications are classified as diuretics, aldosterone antagonists, β receptor antagonist, calcium channel blockers, α-adrenergic blocker, ACE inhibitor and angiotensin Ⅱ receptor blocker (Katzung, 2017; Kasper et al, 2018; JNC 8, 2014). Concise pharmacology of these group of drugs as deliberated in Katzung (2017), Kasper et al, (2018) and JNC-8 (2014) are described as follows:

6.1.1 Diuretics

Thiazide diuretics lowers blood pressure by promoting excretion of sodium by inhibiting Na+/Cl- pump in the distal convoluted tubule. They are considered safe, effective and cheap with low clinical incidents. They offer synergistic blood pressure lowering impacts when given along with beta blockers, ACE inhibitors or angiotensin receptor blocker. Normally the doses of hydrochloro-thiazide ranges from 6.25 to 50 mg/day. Due to high incidences of metabolic adverse

effects including hypokalemia, insulin resistance and elevated cholesterol level, higher doses are not recommended. Additionally, potassium sparing loop diuretics such as amiloride and triamterene can be used in combination with thiazide diuretics to avert hypokalemia. Loop diuretics act on Na+-K+-2Cl- at the ascending limb of the loop of Henle. They are usually suitable for hypertensive patients with reduced glomerular filtration rate and congestive heart failure.

6.1.2 Aldosterone antagonists

Aldactone is nonselective aldosterone antagonist which may be effective agent for management of hypertensive patients with low-renin primary hypertension, resistant hypertension and primary aldosteronism. It can be given singly or in combination with other antihypertensive agents. In patient with congestive heart failure, low dose of aldactone lowers risk of mortality and hospitalization. However, due to its adverse effects such as impotence, gynecomastia and menstrual disorders, newer agent called eplerenon (selective aldosterone antagonist) is recommended.

6.1.3 β receptor antagonist

Beta blocker antagonize the effect of catecholamine by competitively binding at beta adrenoceptors. This result in reduction in heart rate and contractility thereby reducing blood pressure. Another mechanism by which they reduce the blood pressure is by suppression of renin release. β blockers are highly efficacious in treating hypertensive patients with tachycardia, heart disease and other comorbidities (Kasper et al., 2018). It is classified into cardioselective (atenolol), non-selective (metoprolol & propranolol) and combined alpha and beta (Carvedilol). However, the potency in lowering the blood pressure among these categories of beta blockers were found the same.

6.1.4 Calcium channel blockers [CCB]

These group of drugs lessen vascular resistance via L-channel blockade, which lowers intracellular calcium and blunts vasoconstriction. Monotherapy or in combination with other agents such as ACEIs, β blockers and α-adrenergic blocker, CCB effectively reduces blood pressure. Nifedipine is one of drugs which belongs to CCB and the usual dose ranges from 30 to 60 mg/day. These group of drugs are contraindicated for second or third degree heart block. Some of adverse effects of calcium channel blocker include flushing, edema and headache.

6.1.5 α-adrenergic blocker

Alpha adrenergic antagonist reduces blood pressure by lowering peripheral vascular resistance (Kasper et al., 2018). They are highly potent in reducing the blood pressure either in lone therapy or in combination with other agents. Some of the α-adrenergic blockers are prazosin, doxazosin, terazosin and phenoxybenzamine.

6.1.6 ACE inhibitor and angiotensin Ⅱ receptor blocker

Commonly used angiotensin-converting enzyme inhibitor [ACEI] drugs for management of hypertension are benazepril, captopril, enalapril, fosinopril, lisinopril and ramipril among others (Katzung, 2017; Kasper et al, 2018). These drugs antagonize the action of enzyme that convert angiotensin Ⅰ to angiotensin Ⅱ. Angiotensin Ⅱ is the hormone responsible for constriction of blood vessels (vasoconstriction) and release of aldosterone which help retain sodium and water in the body. Angiotensin Ⅱ by its vasoconstrictive effect and retention of fluid by releasing aldosterone, causes elevation of blood pressure. Hence by disabling the formation of angiotensin Ⅱ, ACEI causes reduction in blood pressure. Side effects of ACEI include hypotension, headache and reduction in GFR. Serious adverse effect of ACEI are angioedema and hyperkalemia.

6.2 Non-pharmacological management

Non-pharmacological intervention which mainly entails lifestyle modification is instrumental for prevention and management of hypertension. Lifestyle modification refers to adoption of healthy lifestyles such as ingestion of healthy diet, physical activity, weight reduction, moderation in alcohol consumption, cessation of smoking, adherence to prescribed medication and stress management (JNC 7, 2003; Kasper et al, 2018) which are described as follows:

6.2.1 Dietary management

Nutrition plays very important role in prevention and management of lifestyle diseases including hypertension. Dietary Approach to Stop Hypertension (DASH) diet which stood test of time in preventing and lowering blood pressure is recommended for hypertensive cases. DASH diet is low sodium and low-fat dietary approach which emphasizes high consumption of fruits and vegetables(Feyh et al.,

2016b). DASH dietary regimen also de-emphasizes inclusion of cholesterol and saturated fatty acid in the diet to prevent abnormalities in lipid metabolism (Japanese Society of Hypertension, 2009). Because fruits and vegetable plays pivotal role in prevention of cancer, cardiovascular diseases and many other health conditions, World Health Organization recommends that every individual should take minimum of five daily serving of fruits and /or vegetables. The diet must also contain adequate amount of potassium which is found to reduce blood pressure by blunting the effect of sodium and relaxation of blood vessel (WHO, 2016). Daily recommended intake of potassium for adult is 4700 g and can be achieved by consuming banana and sweet potatoes (Benjamin & Colleagues, 2018).

DASH diet is effective strategy in lowering blood pressure for both hypertensive and non-hypertensive cases. This is evident from a study in Japan which reported impressive reduction of blood pressure in two months and six months periods among hypertensive participants who consumed DASH-Japan Ube Modified diet Program (DASH-JUMP) diet as: (153±14/91±11 mmHg at baseline→ 130±16/80±9 mmHg at 2 months, p <.001) and 139±16/85±10 mmHg at 6 months, p <.001) (Kawamura et al., 2016). Further, it is also known that consumption of DASH diet is associated with 11 mmHg and 3 mmHg reduction in blood pressure for hypertensive and non-hypertensive cases respectively (Whelton et al., 2018)

6.2.2 Low salt diet

Normally kidneys remove excess water from the body through delicate balance of sodium and potassium. Ingestion of salt causes derangement of sodium and potassium balance which negatively affect the kidney's ability to remove the fluid resulting in accumulation of unwanted fluid which eventually raises blood pressure (Feyh et al., 2016a). In addition, sodium is also found to trigger production of vasoconstrictive prostaglandin which elevate blood pressure. Hence, there is positive linear relationship between sodium intake and blood pressure.

There are strong body of evidences to show how consumption of salt is directly linked to hypertension. According to WHO, salt consumption of less than 5 grams per day in adult is associated with dramatic lowering of blood pressure and significant decline in risk of cardiovascular diseases, stroke & coronary heart attack (WHO, 2016). A modeling study in Europe predicted that the reduction of salt intake

of 5 gm per day would reduce stroke by 10.1% in Finland and 23.1% in Poland (Hendriksen, van Raaij, Geleijnse, Breda, & Boshuizen, 2015). A review by Feyh (2017) also shows that compared to high sodium diet, DASH diet with low sodium of 65 mmols/day or less is associated with decreased in systolic blood pressure of 11.5 mmHg and 7.1 mmHg in hypertensive subjects and non-hypertensive subjects respectively. Similarly, significant positive correlation was reported between systolic blood pressure (SBP) and diastolic blood pressure (DBP) with salt intake (*r* = 0.5, *p* <.001) (Hasandokht, Farajzadegan, Siadat, Paknahad, & Rajati, 2015)

In order to reduce incidence of high salt consumption among the population, it is important to understand the source of salt. Main source of salt in the diet is highly variable based on the developmental status of the countries viz: in the developed countries 75% of the salt comes from processed food while 70% of salt in the developing countries comes from addition of salt during cooking (He, Campbell, & MacGregor, 2012). Even in Bhutan, addition of salt while cooking and consumption of processed food were the main sources of salt. According to the survey conducted by the Ministry of Health (2015), 41.6% of respondents always add salt when preparing food and 11.1% of the respondents always consume processed food in Bhutan. Thus, the key strategy for reduction of salt must include formulation of government policy to ensure that manufacturers and retailers produce healthy food, consumer awareness and empowerment to reduce salt intake, creating enabling environment for salt reduction through local policy intervention, promotion of healthy food settings such as in school, communities etc (Ministry of Health, 2015). Health professional should advocate clients visiting the health centers to reduce amount of salt used in cooking, limit salty snacks, encourage to choose products with low sodium content and provide targeted dietary advice (WHO, 2016).

6.2.3 Weight loss

Maintaining appropriate body weight to achieve target body mass index of 18.5 to 24.9 kg/m^2 is recommended (Kasper et al., 2018) to prevent and control hypertension. Overweight or obesity put extra strain on the heart; raise blood pressure and blood cholesterol (American Heart Association, 2015). While weight reduction of 3% to 9% of body weight is associated with 3 mmHg decreases in both SBP and DBP (Lochner, Rugge & Judkins, 2006), overweight is reported to be the

significant predictor of uncontrolled blood pressure (AOR = 4.52, 95% CI: 2.24-9.12) **(**Gebremichael, Berhe, & Zemichael, 2019**).** Similar study also reported an association between blood pressure and weight (r = 0.55, p <.001) (Hasandokht et al., 2015).

Following strategies are recommended to achieve weight reduction: avoidance of sugary, salty and fatty food (American Heart Association, 2015), low carbohydrate diet (Brehm, Seeley, Daniels, & D'Alessio, 2003), regular exercise of more than 30 minutes per day for five days a week (Gaesser, Angadi, Sawyer, Tucker, & Jarrett, 2015), inclusion of high dietary fiber in the meal (Clark & Slavin, 2013), chewing food slowly and thoroughly (Kokkinos et al., 2010), drinking 500 ml of water 30 minutes prior to main meal (Dennis et al., 2010), and high protein diet (Weigle et al., 2005).

6.2.4 Moderation in alcohol consumption

Globally, 3 million deaths result from harmful use of alcohol per year which represent more than 5% of global deaths (WHO, 2018c). Binge alcohol consumption is associated with significant escalation of blood pressure (Santana et al., 2018) which can subsequently result in dreadful consequences like stroke. Also a study in India shows that drinking alcohol account for 30% of hypertension prevalence among the population (Bhise & Patra, 2018). While consumption of alcohol in any magnitude is hazardous to health, for binge drinker it is recommended that intake of alcohol should be restricted to ≤ 20-30 ml ethanol per day for men and ≤ 10-20 ml ethanol per day for women (Japanese Society of Hypertension, 2009).

To reduce harmful use of alcohol among the population multi-sectorial and inter-agency collaboration is essential. Healthcare providers like nurses can also play active role in creating awareness regarding harmful use of alcohol.

6.2.5 Smoking cessation

Smoking is implicated for raise in blood pressure mainly through activation of sympathetic nervous system. Smoking in any form should be avoided as it is major risk factor for cardiovascular diseases and is associated with raised blood pressure (Japanese Society of Hypertension, 2009). A study carried out in India reported that smoking cigarette accounts for 31% prevalence in hypertension (Bhise & Patra, 2018).

Strategies that can be integrated to promote smoking cessation must include health education on ill-effect of smoking and smoking cessation programs (Samadian, Dalili, & Jamalian, 2016). Healthcare provider should periodically encourage and advise smoker to quit smoking (Japanese Society of Hypertension, 2009). In addition, enforcement of existing policies that forbid production, distribution and sales should be further strengthened (Ministry of Health, 2015).

6.2.6 Physical activity

According to World Health Organization (2019c), physical activity is defined as execution of any bodily movement involving skeletal muscle that warrants expenditure of energy. Following recommendations on physical activity by WHO are noteworthy: For adults in the age bracket of 18 to 64 years, the recommended physical activity encompasses leisure time physical activity like walking, dancing, gardening, hiking and swimming; transportation such as walking or cycling; others like performance of household chores, games, sports or planned exercise. In order to reap excellent health benefits of physical activity, the adults should perform at least 150 minutes of moderate-intensity physical activity in a week. Aerobic activity should be carried out in a period of at least 10 minutes duration. In addition, activity to improve the strength of muscle should be done at least twice a week. For those 65 years or older, the level and duration of physical activity are same as for adult in age group of 18-64 years except that those with poor mobility should engage in specific activity to improve balance and prevent falls at least three times a week.

While engagement in adequately regular physical activity is associated with reduction of risk of hypertension, coronary heart diseases, stroke, diabetes, breast and colon cancer and depression, lack of physical activity is estimated to be responsible for 21-25% of breast and colon cancer, 27% of diabetes, and 30% of ischemic heart disease burden (WHO, 2019c). More importantly, high level of physical activity is associated with dramatic reduction in blood pressure independent of its relation with weight reduction. A review study reported that regular aerobic exercise is associated with 4 mmHg reduction in systolic blood pressure (Alsaigh, Alanazi, & Alkahtani, 2018). Similarly, a negative correlation was reported between blood pressure and physical activity (r = -0.6, p <.001) (Hasandokht et al., 2015). Further, a recently published guideline shows that mean reduction of systolic blood pressure associated

with aerobic exercise was 2-4 mmHg and 5-8 mmHg respectively for normotensive and hypertensive adult (Whelton et al., 2018)

6.2.7 Stress management

Psychological stress is associated with increased blood pressure (Dar et al, 2019). As the level of psychological stress increases there is corresponding rise in incidences of hypertension. For instance, incident of hypertension was 38.2% among those with high level of stress compared to only 30.6% among those with low level of stress (Spruill et al., 2019). A cross sectional study in China involving 5976 middle-aged population reported that stress was significantly related to hypertension (OR=1.24 ,95%CI: 1.07-1.44). Similarly, a study reveals that high stress was associated with higher systolic blood pressure (p =.02), low pharmacological adherence and suboptimal blood pressure control (p =.04).

Therefore, stress management through relaxation techniques and mindfulness training is crucial (Holman, Johnson, & O'Connor, 2018). Progressive muscle relaxation and meditation are recommended methods to induce relaxation. Mindful training entails engaging in yoga and meditation exercise in which negative thoughts and emotions are allowed to flow into one's mind without resisting it (de Vibe et al. 2013; Holman, Johnson, & O'Connor, 2018). A study showed that regular engagment in yoga significantly reduces stress (p <.001) (Shohani et al., 2018; Tripathi, Kumari, & Ganpat, 2018). Similar study also shows that meditation is effective in reducing stress (p <.001) and reduction in blood pressure (Innes, Selfe, Brown, Rose, & Thompson-Heisterman, 2012).

Among the risk factors, unhealthy lifestyle is responsible for significant rise in incidence and prevalence of hypertension (WHO, 2019). Therefore, adoption of lifestyle modification is essential to nail down the growing burden of hypertension. However, evidences show that practice of lifestyle modification across the world is poor. For example, a study reports that overall adherence to lifestyle modification among the people in Ethiopia was 23% (Tibebu, Mengistu, & Negesa, 2017) with similar lifestyle modification trend observed in Jordan (Alefan, Huwari, Alshogran, & Jarrah, 2019). In line with this, only 15.6% of the participants in Indonesia reported practicing good lifestyle modification which is significantly low (Giena, Thongpat, & Nitirat, 2018). Even in Bhutan, majority of adult populations are not following

recommended lifestyle modification thus exposing themselves to number of risk factors for hypertension (Pelzom, Isaakidis, Oo, Gurung & Yangchen, 2017; Ministry of Health, 2015).

Lifestyle among hypertensive population in Bhutan.

Lifestyle among the people of Bhutan is grounded in its tradition, religion and spiritual belief. For instance consumption of alcohol is considered as socially accepted norm (Dorji & Dorji, 2005) while smoking or use of tobacco products in any form is considered as unwholesome and sinful. As enshrined in Buddhist holy texts, Bhutanese believe in law of cause and effect known as 'Karma'; this spiritual belief prohibit people from inflicting harms to others. Because all the sentient beings including microscopic creatures are considered as their mother (Rinpoche, 1998), this ensures social cohesion and harmony among the people. Though no research was done, existing data suggest that Bhutanese people do engage in chanting of prayers and meditation practice (Dorji & Dorji, 2005), and offer puja to Medicine Buddha to prevent and cure disease (McKay, & Wangchuk, 2005). Thus to provide culturally congruent healthcare services, systems are in place to cater both traditional and modern medical health services under one roof (Thinley et al, 2017). In terms of diet, traditional national dishes of Bhutan are red rice, ema datse (Chilli pepper and cheese stew) and suja (salted butter tea) (Wangdi, 2013) which is high in salt, fats and carbohydrate which increases their risks for non-communicable diseases.

In Bhutan, hypertension is number one non-communicable diseases affecting its population. Prevalence of hypertensive cases increased by more than twofold (35.6%) in 2014 (Ministry of Health, 2015) from 16% in 2012 (National Health Survey, 2012) culminating in fatal complications such as stroke, myocardial infarction and chronic kidney diseases in the country (Wangdi, 2013; Ministry of Health, 2018). Incidence of hypertension rose from 278 per 10,000 populations in 2017 to 343 per 10,000 populations in 2018 (Ministry of Health, 2019). It is a matter of immense concern to note that rise in hypertensive cases is associated with corresponding increase in number of stroke cases in the country. For instance, number of hypertensive cases and stroke cases reported in 2017 were 21,669 and 460 respectively while it was 24,959 and 544 cases respectively in 2018 (Ministry of

Health, 2019; Ministry of Health, 2018). Additionally, though no published empirical data is available, a retrospective survey indicates stroke as leading causes of death in 2018 at the National Referral Hospital with hypertension accounting for 50% of stroke cases (Tshomo, 2019). The reason for sharp rise in morbidity and mortality of hypertension in Bhutan could be due to unhealthy lifestyle among the population.

People in Bhutan were found to exposed to major modifiable risk factors for hypertension as reported in STEPS survey carried out in 2014. According to the survey 13.5% of the adults in Bhutan (18-69 years) were exposed to ≥ 3 modifiable risk factors for NCD. The survey report also demonstrates that 22% of adults were physically inactive, 42.4% were current alcohol drinkers, 33.5% of adults were obese or overweight, salt consumption was 9 gm/day which is almost double the WHO recommended limit, consumption of fruits and vegetable was low, more than 50% of population did not engage in vigorious physical activity, 9% of adult had raised blood sugar and 88.1% with high blood pressure (SBP > 140 and/or DBP > 90 mmHg) were not on antihypertensive medication.

While non-adherence to antihypertensive medication could be due to prevalence on deeply grounded myths and orthodox belief that medication can result in kidney failure, rise in obesity can be attributed to unhealthy diet which contains high carbohydrate and fat which is taken three times a day (Thinley et al, 2017; Kumar, 2015). It is also interesting to note that 14.3% and 6.5% of respondents in age group of 40-69 years were found to sought traditional healer & took traditional medicine respectively to control raised blood pressure (Ministry of Health, 2015). More importantly, it is alarming to note that prevalence of high salt intake, unhealthy diet and consumption of tobacco were 99%, 67% and 25% respectively among the adult Bhutanese (Pelzom, Isaakidis, Oo, Gurung & Yangchen, 2017). The aforementioned data provides vivid picture regarding lifestyle modification among the general population which is unsatisfactory. However, little is known about the lifestyle modification among the cohort of persons with hypertension which warrants further investigations. Therefore, it is essential to investigate and find out the factors predicting lifestyle modification among hypertensive population in Bhutan.

Individual and family self-management theory

Individual and family self-management theory is mid-range descriptive theory which outlines individual and family's engagement in self-management behavior – lifestyle modification (Ryan & Sawin, 2009). The theory is structured into three dimensions consisting of contextual, process and outcome.

Contextual dimension consists of condition specific factors, physical and social environment, and unique characteristics of individual and family members which hamper or enhance engagement in lifestyle modification. Condition specific factors include complexity of condition or treatment, trajectory, physiological stability or physiological transitions which affect the nature and type of behavior. Physical and social factors consist of access to healthcare, transportation, culture, work, neighborhood and social capital. Individual and family characteristics include developmental stages, literacy, cognitive status, perspective among others.

The process of self-management refers to use of self-regulation skills for management of chronic conditions. This process comprises activities like goal setting, self-monitoring and reflective thinking, decision making, planning for and engaging in specific behavior – the lifestyle modification. According to this theory individuals are likely to engage in recommended health behavior - lifestyle modification, if they embrace health beliefs consistent with behavior, if they develop self-regulation abilities and if they experience social facilitation. Knowledge and beliefs which corresponds to hypertension knowledge and belief about medicine in the current study impact behavior specific self-efficacy, outcome expectancy and goal congruence. Social facilitation include concepts of social influence, social support and negotiated collaboration between individuals and families and health professionals.

Outcomes in this theory consist of both proximal and distal. Proximal outcome is the outcome of concern such as individual and family's engagement in recommended lifestyle modification which results in distal outcomes such as improvement in health system.

All the three dimensions in this theory are interlinked among each other. The factors in context dimension affect an individual's and family's ability to engage in process dimension and have direct impact on the outcomes. The constructs in process dimensions are linked to construct in context dimensions, and impact the outcome

dimension. Enhancement of knowledge (hypertension knowledge) and specific health belief (belief about medicine) are linked to self-regulation behavior. Social facilitation is inter-related to knowledge, belief and self-regulation. Constructs on outcome dimension is influenced by both process and context dimensions.

Factors influencing lifestyle modification

Lifestyle modification is the primary outcome of self-management which is influenced by number of factors (Ryan & Sawin, 2009). According to individual and family self-management theory and review of literatures, lifestyle modification is known to be predicted by the factors such as knowledge, belief, self-efficacy and social support which corresponds to hypertension knowledge, perceived self-efficacy, belief about medicine and perceived social support in the current study (Ryan & Sawin, 2009). These factors are discussed under the following headings:

1. Hypertension knowledge

On one hand, health literacy is defined as cognitive and social skills governing motivation and capability of persons in gaining access to, understand and utilize information for promotion and maintenance of good health (WHO, 2019d). On other hand, knowledge refers to factual information about health condition or health behavior (Ryan & Sawin, 2009). Specifically, hypertension knowledge refers to the ability of the persons with hypertension to understand factual information (Ryan & Sawin, 2009) about hypertension such as definition of hypertension, etiology , medical treatment and complication of hypertension, as well as attitude and behavior about drug compliance, diet and lifestyle (Erkoc, Isikli, Metintas & Kalyoncu, 2012).

Although it is presumed that possession of hypertension knowledge does not always translate to practice of lifestyle modification among the population, ample of evidences show high degree of association between these factors (Giena, Thongpat, & Nitirat, 2018). Compliance to physical activity was reported to be better among those with good hypertension knowledge (AOR = 2.58, 95% CI 1.12-5.94) compared to those who lack such knowledge (Labata, Ahmed, Mekonen, & Daba, 2017). Similar study also shows that hypertension knowledge predicted 8.1% of variance in practice of lifestyle modification among the hypertensive cohort (β = .28, p .005) (Jandeekaewsakul, Watthayu, & Suwonnaroop, 2018). A study involving 221

hypertensive patients in Cameroon demonstrates that those who were knowledgeable on hypertension were 2.9 times more like to exhibit compliance to lifestyle modification practice compared to those with low hypertension knowledge (Akoko, Fon, Ngu, Ngu, & Ngu, 2016). In Bhutan, prevalence of several local dialects, imposition of social isolation by rugged geographical terrain and lack of informational network in few pockets of Bhutan are some of the barriers which impede the flow of health-related knowledge from healthcare providers to the patients. Moreover, owing to lack of literature, it is not known the level of hypertension knowledge and its influence on lifestyle modification among persons with hypertension in Bhutan which warrants deeper inquiry.

2. Belief about medicine

Beliefs is a modifiable factor that bridges socialization and behavior. It is enduring individual attributes which is responsible for streamlining behavior. It refers to the patient's attitude toward taking medication, description of wants and concerns, understandings, beliefs and behaviors (Niriayo & Colleagues, 2019) According to individual and family self-management theory, individuls are likely to engage in lifestyle modification if they embrace health belief which is consistent with their behavior (Ryan & Sawin, 2009).

Belief about medicine is known to influence lifestyle modification among hypertensive population by impacting behavior specific self-efficacy, outcome expectancy and goal congruence (Ryan & Sawin, 2009). A cross-sectional study in Ethiopia comprising 309 hypertensive patients reported that participants harbouring negative belief on medication (AOR = 0.25, 95% CI: 0.14-0.46) were less likely to adhere to prescribed self-care practice and medication regimen compared to those with positive belief (Niriayo et al, 2019). In conjunction to this, a descriptive study with 312 hypertensive patients was carried out in Jordan to examine their lifestyle modification (Alhalaiqa, Al-Nawafleh, Batiha, Masa'deh, & Al-Razek, 2016). The study findings showed significant correlation between systolic blood pressure and belief about medicine subscales viz: those participants who believe that drug is overprescribed (r = .18, p = .005), intrinsically harmful (r = .15 p = .005) and highly sensitive (r = .16, p = .004) experienced increased systolic blood pressure while those who believe in benefit of drugs (r = .17 p = .002) had reduced systolic blood pressure.

Similar study by Lemay, Waheedi, Al-Sharqawi, & Bayoud (2018) reported that compliance to the medication was negatively influenced by higher negative beliefs toward medication (β = -.46). Significant correlation was observed between medication adherence and necessity beliefs (r = .32, 95% CI: .21-.43) among the Chinese population (Nie, Chapman, Chen, Wang, & Wei, 2019). A study by Akoko, Fon, Ngu, Ngu, & Ngu (2016) demonstrated belief about medicine as independent predictor (AOR = 5.49, 95% CI: 0.24-126.04) of patient's compliance to antihypertensive medication. Further a study in Jordan reported that positive beliefs in management of hypertension were significant independent predictors (OR = 2.79, 95% CI: 1.48-4.94) of patient's adherence to lifestyle modification (Alefan, Huwari, Alshogran, & Jarrah, 2019).

Myth and superstitious belief on diseases and medications are common phenomena surrounding people of Bhutan. Many people still believe that illness result when the individual is possessed by spirit or due to annoyance of local deity (Sherab & Lhendup, 2008; Thinley et al, 2017). People also cling on the false belief that ingestion of medication such as blood pressure lowering medication can cause permanent kidney injury (Tshomo, 2019) which present formidable obstacle for healthcare providers in managing hypertension. Despite prevalence of false unshakable belief regarding the disease and medication, it is not known how such belief influence lifestyle modification among persons with hypertension in Bhutan

3. Perceived self-efficacy

Perceived self-efficacy refers to a degree of confidence persons with hypertension has in his or her ability to participate in a given activities (Labata, Ahmed, Mekonen, & Daba, 2019) under normal or stressful situation (Ryan, & Sawin, 2009). Self-efficacy also refers to judgment of personal capability to organize and execute a health promoting behavior (Pender, Murdaugh & Parsons, 2015). According to authors, higher perceived self-efficacy reduces or eliminates perceived barriers to action which in turn directly influences execution of healthful behavior or through increasing the commitment to a plan of action. Thus self-efficacy can be one of the important determinants of lifestyle modification among the patients with hypertension.

A number of studies were conducted to examine the impact of perceived self-efficacy on promoting and maintaining prescribed lifestyle modification. A study involving 190 hypertensive populations reported that those with high perceived self-efficacy were more likely to engage in physical activities and eating low salt diet compared to those with low self-efficacy (Warren-Findlow et al, 2012). Similarly a study by (Tibebu, Mengistu, & Negesa, 2017) with 404 hypertensive patients demonstrated that those participants with good self-efficacy were four times more likely to adhere to lifestyle modification than those with low self-efficacy. Likewise, a study by Kumar (2015) reported strong association between self-efficacy and lifestyle modification among the cohort of hypertensive population ($r = .55$ $p < .001$). In line with this, a cross-sectional study comprising of 333 older adults with hypertension reported that education, knowledge, self-efficacy, perceived barriers, social support and situational influences, significantly affected the health-promoting behavior accounting for 36.9% of variance (Giena,Thongpat, & Nitirat, 2018). However, among those variables explored in that study, self-efficacy was found to be the strongest predictor of lifestyle modification ($\beta = .32$, $p < .001$). Further, a study conducted in Ethiopia shows that those participants with high level of self-efficacy were 2.6 times more likely (AOR=2.58, 95% CI: 1.41-4.73) to engage in weight management behavior than those with low self-efficacy (Labata, Ahmed, Mekonen, & Daba, 2017).

Despite prevalence of significant association between self-efficacy and lifestyle modification among the patients with hypertension across many countries, the studies which explored such association is limited in Bhutan. Thus it is important to confirm how perceived self-efficacy influence lifestyle modification among persons with hypertension in Bhutan.

4. Perceived social support

Social support plays significant role in psychological well-being and physical health wherein higher perceived support is associated with better mental and physical health outcome (Cohen & Wills, 1985). According to the authors, mechanism through which social support impact health is explained in term of its buffering effect and direct effects. The buffering model states that social support protect against the negative impact of stress while direct effects model postulated that

social support can be beneficial even in absence of stressors. In other words, lack of positive social relationships result in negative psychological states which ultimately influence physical health either through a direct effect on physiological process or through behavioral pattern. Perceive social support from family, friends and significant others encourages and reinforces engagement in healthy behavior (Reblin & Uchino, 2008). According to individual and family self-management theory, perceived social support include provision of emotional, instrumental or informational support which positively impact self-management proces such as lifestyle modification (Ryan & Sawin, 2009).

Myriads of studies show perceived social support as an important ingredient in regulating lifestyle modification among the patients with hypertension. A study by Giena,Thongpat, & Nitirat (2018) in Indonesia reported that perceived social support was one of the important and significant predictor of healthful lifestyle practice among the patients with hypertension. Moreover, it was noted that perceived social support predicted 15.10% of variance in self-management behavior among the cohort of hypertensive patients (β = .36, p < .001) (Jandeekaewsakul, Watthayu, & Suwonnaroop, 2018). In congruence to above findings, a study in Ethiopia demonstrates remarkable association between perceived social support and adherence to low salt diet (AOR = 2.81, 95% CI:1.20-6.53) (Labata, Ahmed, Mekonen, & Daba, 2017). In addition, individuals with good social support were shown more likely to adopt lifestyle modification (AOR = 2.20, 95% CI: 1.27-3.82, p < 0.01) compared to their counterpart (Ademe, Aga, & Gela 2019). A study conducted by Kumar (2015) shows significant association between social support and health promoting behavior (r = .27, p < .05) among the patients with hypertension.

In Bhutan, predominance of joint family in which more than one generations of people live together in common house warrants provision of physical, social, spiritual, psychological and economic support among the members of the family (Leaming, 2004). Viewing beyond the family, there is presence of formidable social cohesion among the people in Bhutan. This extraordinary social network within the family and community level guarantees great deal of cooperation, collaboration and unwavering support among the people. In absence of well-established literature, there

is a gap of knowledge on how social support influences lifestyle modification among persons with hypertension in Bhutan which merits further investigation.

Summary

Hypertension is the world's deadliest silent killer devastating millions of lives and disruption of global economy. Uncontrolled hypertension results in number of catastrophic complications which not only impact the individual patient but also their families and nation as a whole. Therefore, effective management of hypertension is crucial. However, growing body of evidences show that medication alone is not efficacious in controlling raised blood pressure. Thus integration of lifestyle modification such as ingestion of healthy diet, physical activity, weight reduction, moderation in alcohol consumption, cessation of smoking and stress management is essential to triumphantly battle against hypertension. Factors such as hypertension knowledge, belief about medicine, perceived self-efficacy and perceived social support were shown to influence likelihood of persons with hypertension to engage in lifestyle modification. Nonetheless, due to substantial lack of literature, much is not known how aforementioned factors play role in modulation of lifestyle modification among persons with hypertension in Bhutan. In addition, since the lifestyle of Bhutanese are interwoven within the intricate pattern of its unique culture, traditions, values and beliefs, findings from other countries may not be generalizable to its population. Therefore, the objective of this study was to describe lifestyle modification and to examine factors predicting lifestyle modification among persons with hypertension in Punakha, Bhutan guided by individual and family self-management theory. The knowledge generated from the study can be instrumental in devising effective nursing intervention to manage hypertension. It can also be useful for other healthcare providers, planners and policy makers to formulate and adopt appropriate strategies to lower the burden of hypertension by preventing dreadful complications, slashing healthcare cost, lowering premature morbidity and mortality, and by enhancing patients' quality of life.

CHAPTER 3
RESEARCH METHODOLOGY

This chapter focuses on research design, population, sample, setting, instruments, ethical consideration, data collection procedure and data analysis which are elaborated under the following headings:

Research design

A predictive correlational design was used to understand influence of hypertension knowledge, belief about medicine, perceived self-efficacy and perceived social support on lifestyle modification among persons with hypertension in Punakha Bhutan.

Population and sampling

Population

The target population in this study was individuals diagnosed with essential hypertension by a physician based on the mean of two or more seated blood pressure reading of ≥140/90 mmHg on two or more separate occasions or taking blood pressure lowering agents (JNC 7, 2003; JNC 8, 2014) who visited non-communicable disease (NCD) clinic of Punakha District Hospital. As per the data maintained by the hospital, there are 1113 persons with hypertension in Punakha District.

Sample

The sample in this study was the patients with hypertension who visited non-communicable disease (NCD) clinic of Punakha District Hospital during March to May 2020. Recruitment of the sample was based on the following inclusion criteria.

1. Adult aged ≥ 18 to ≤ 60 years.
2. Have been diagnosed with hypertension for at least 6 months. Minimum of six months since diagnosis of hypertension was considered as it is evident that individuals take 18 days to nine months to build and adapt with new lifestyle (Lally, Van Jaarsveld, Potts, & Wardle, 2010).
3. Taking at least one anti-hypertensive medication.

4. Able to read and write in English.

5. No disabilities such as visual impairment, deafness, dumbness and paralysis.

6. No history of stroke.

7. No history of psychiatric illness such as schizophrenia, bipolar affective disorder and depression.

Sample size

Tabachnick and Fidell's formula (2009) was used to calculate sample size in this study. The formula is given by $N \geq 104+m$ (where N is required sample size and m is number of independent variables). Since there are four independent variables in the current study, the sample size required was at least 108.

Sampling technique

Eligible participants for the study was selected using simple random sampling technique. This method warrants that every participant has exactly equal opportunity to be selected for the study (Gray, Grove, & Sutherland, 2019). The following steps were followed while selecting the participants:

1. On each day of data collection, the researcher wrote odd (1) and even (2) number on two separate slip of papers.

2. The slip of papers was rolled and put into the box.

3. One slip of the paper was randomly drawn from the box.

4. If odd number was selected, potential participants for the day were those bearing odd registration number. The researcher approached the eligible participants bearing odd registration number and enquired their willingness to participate in the study. Those participants who were willing and volunteered to take part in the study were recruited after obtaining their informed consent.

5. Similar process was followed for recruitment of those participants bearing even registration number, if number drawn from the box was even.

6. To ensure quality of data collection, maximum of 8 participants were randomly selected from 9AM to 1PM in a day.

7. Data collection was continued on every working day till required number of samples of 108 was obtained.

Study setting

The study was conducted at non-communicable disease (NCD) clinic of Punakha District Hospital of Bhutan. Service timing of the clinic is from 9AM to 3PM on week days & 9AM to 1PM on Saturday. Managed collaboratively by a doctor, a nurse, a nutritionist and other paramedical staff, the clinic is actively involved in implementation of WHO Package of Essential Non-communicable disease program (WHO PEN program) which was piloted by Ministry of Health in collaboration with World Health Organization (Thinley et al, 2017). This program ensures provision of patient-centered essential healthcare services such as diagnosis and treatment, follow up care and counseling on lifestyle modification for persons with non-communicable diseases based on the standard guideline developed by the World Health Organization. The main role of nurses at the clinic include measuring blood pressure, investigating random blood sugar, assessing body mass index (BMI) and delivering health counseling for the patients. On an average NCD clinic records more than 200 cases of hypertension per month.

Research instruments

There were six self-administered questionnaires which were all in English version including Demographic Questionnaire, Hypertension Self-Care Profile Behavior Scale [HBP SCP-Behavior scale], Hypertension Knowledge-Level Scale [HK-LS], Belief About Medicine Questionnaire [BMQ], Hypertension Self-Efficacy Scale and Multi-diminensional Scale of Perceived Social Support [MSPSS]. Details of each questionnaire is elucidated as under:

Demographic questionnaire

Demographic record form include age, gender, marital status, educational level, employment status, monthly income of the family, adequacy of income, sources of information, history of attending hypertension awareness program, history of smoking and drinking alcohol, history of taking other unprescribed medicines to control blood pressure, comorbidities, duration since hypertension was diagnosed, name and number of blood pressure lowering medication, current blood pressure, height, weight and body mass index.

Hypertension self-care profile behavior scale [HB-SCP Behavior Scale]

Hypertension Self-Care Profile Behavior Scale was used to measure lifestyle modification among the participants. It was developed by Han, Lee, Commodore-Mensah and Kim in 2014. Development of the instrument was theoretically grounded on Orem's self-care model and motivational interviewing.

The scale consisted of 20 items hypertension self-care behavior including taking medication (items 14, 15, 16 and 20), physical activity (item 1) , low sodium and low fat diet (items 2 to 11), restricting alcohol consumption (item 12), non-smoking (item 13), weight control (item 17), and stress reduction (items 18 and 19). Items 15 and 16 were reversed coded. Scoring on each item was based on four points interval scale (1 = Never, 2 = Rarely 3 = sometimes and 4 = Always). The total score of the scale range from 20 to 80 with higher score indicating high level of hypertension self-care behavior which reflects lifestyle modification. Lifestyle modification can be also be leveled as high for those participants who score greater than or equal to overall mean (Ademe, Aga & Gela, 2019). Further individual can be said to follow good lifestyle modification if they always perform the recommended activity (AlHadlaq & Colleagues, 2019).

Psychometric properties of the instrument were validated with 213 hypertensive patients (Han, Lee, Commodore-Mensah, & Kim, 2014). It has demonstrated reliability with alpha coefficient of .83.

Hypertension knowledge-level scale [HK-LS]

Hypertension Knowledge-Level Scale (HK-LS) was used to measure level of hypertension knowledge among the participants. It was developed by Erkoc, Isikli, Metintas and Kalyoncu in 2012 based on scientific data extracted from the Turkish Society of Cardiology and International Hypertension Association.

Hypertension Knowledge-Level Scale consisted of 22 items categorized into six sub-dimensions of definition, medical treatment, drug compliance, lifestyle, diet and complication. Statement in each item was either correct or incorrect where respondents provided standard response as "Correct, Incorrect or Don't Know". Correct response was given 1 point each while an incorrect statement or don't know was given zero. Possible score for the scale range from 0 to 22 with higher score indicating better hypertension knowledge. The score obtained was summed up and

was converted into percent to label hypertension knowledge as good ≥ 80%, fair 60-79% and poor ≤ 60%.(Giena, Thongpat, Nitirat, 2018; Shrestha, Wattanakitkrileart, Pongthavornkamol, 2019)

Hypertension Knowledge-Level Scale demonstrated exceptional level of reliability and validity. These psychometric properties were tested for 414 adults with personal and family history of hypertension (Erkoc, Isikli, Metintas, & Kalyoncu, 2012). Construct validity was ensured by factor analysis using Kaiser Meyer Olkin test (0.78). Cronbach alpha coefficients was .82 for the entire scale.

Belief about medicine questionnaire [BMQ]

Belief About Medicine Questionnaire [BMQ] was used to measure patient's general and specific belief of taking medication. It was developed by Horne, Weinman and Hankins in 1999 based on themes identified in published research studies and interview with chronically ill patients. The instrument consisted of 18 items embedded within two main domains concerning specific and general belief about medicine. Specific belief about medicine was categorized into two sub-domains: specific necessity and specific concern each comprising of 5 items. Domain on general belief about medicine has two sub-domains with four items each: general overuse and general harm.

Scoring on each item was based on 5 points Likert scale (1 = strongly disagree, 2 = disagree, 3 = no comments, 4 = agree and 5 = strongly agree). The score for each specific necessity and specific concern range from 5 to 25. The participants were said to possess strong medication necessity belief if average score of specific necessity subscale is above the midpoint (> 12.5); otherwise they were said to have poor medication necessity belief (Niriayo & Colleagues, 2019). Likewise, participants were said to hold strong medication concern belief if average score of specific concern subscale (ranging from 5-25) is above the midpoint (> 12.5); otherwise they were said to have poor medication concern belief. In the same way, higher score on the sub-domain of general overuse and general harm demonstrated more negative opinions in terms of drugs prescription and more negative perspective to all drugs respectively.

Psychometric properties of this instrument was tested with diverse cohort of chronic disease patients including diabetes, asthma, psychiatric & cardiac patients

among others (Horne, Weinman, & Hankins, 1999). Both general and specific subscales of the instrument had satisfactory reliability and validity. Further reliability and validity of the BMQ instrument was tested for 612 patients in Iran (Mostafavi, Najimi, Sharifirad & Golshiri, 2016). The scale demonstrated strong validity with average content validity index of .93. The reliability coefficient for subscale of specific concern, specific necessity, general harm and general overuse were .90, .89, .93 & .85 respectively. Overall reliability coefficient of BMQ was reported .91.

Hypertension self-efficacy scale

Hypertension Self-efficacy Scale was used to measure perceived self-efficacy of the participants. It was developed by Warren-Findlow and Colleagues in 2018. It consisted of five items and each item begins with the phrase "How confident are you that you can…?" Response ranges from 1 (not confident at all) to 10 (totally confident). A mean score of 9 or greater (≥ 9) was classified as having good self-efficacy while the mean score lower than 9 is considered as poor self-efficacy (Warren-Findlow, Seymour, & Huber, 2012)

Psychometric properties Hypertension Self-Efficacy Scale was tested for 190 African American with hypertension and was found to be reliable and valid. Reliability coefficient for the scale was .81. High self-efficacy was found to be strongly associated with five of the six prescribed self-care activities (Warren-Findlow, Seymour, & Huber, 2012) indicating the validity of the scale.

Multi-diminensional scale of perceived social support [MSPSS]

Multi-dimensional Scale of Perceived Social Support was used to measure participant's perceived instrumental, informational and emotional social support from family, significant others and friends (Zimet, Dahlem, Zimet, & Farely,1988). The scale is found to be useful in measuring perceived social support among hypertensive patients (Giena,Thongpat, & Nitirat, 2018). It comprised of 12 items self-report questionnaire rated on a seven-point Likert scale viz: 1= very strongly disagree, 2= strongly disagree, 3 = mildly disagree, 4 = neutral, 5 = mildly agree, 6 = strongly agree and 7 = very strongly agree. The total score ranges from 12 to 84 while the mean score of the scale ranges from 1 to 7. Based on the mean score, magnitude of social support was categorized as low: 1-2.9, moderate 3-5 and high 5.1-7(Zimet, Dahlem, Zimet & Farely,1988).

The instrument has robust psychometric properties. Construct validity of the instruments was authenticated by significant negative association of the scale to measures of depression and anxiety (Zimet et al, 1998 as cited in Zimet, 1998). Validity of the instrument was further confirmed through factor analysis (Hardan-Khalil, 2015). The scale also has strong internal consistency with alpha coefficient ranging from .93 to .98 for total score (Zimet et al., 1988 as cited in Hardan-Khalil, 2015). The test-retest reliability of the instruments was tested for a subgroup of 69 of 275 Duke University undergraduates which reported reliability coefficient of .85, .75 and .72 respectively for the subscales of family, friends and significant others; and test-retest reliability coefficient for the whole scale was .85 (Zimet et al, 1988 as cited in Zimet, 1998).

Psychometric properties of instruments

Validity

Instruments that were used for the current study were standard instruments with well-established validity. Hence testing of instruments for validity was not done.

Reliability

Pilot study was carried out at non-communicable disease unit of Punakha District Hospital on 30 persons with hypertension who fulfilled the same inclusion criteria with the sample in the study to test the reliability of the instruments. The results generated Cronbach alpha coefficient of .84 for Hypertension Self-Care Profile Behavior Scale (HBP SCP-Behavior scale). Cronbach alpha coefficient was .77 for Belief About Medicine Questionnaire (BMQ). For the subscales of this questionnaire, Cronbach alpha coefficient were .61, .77, .86, and .82 respectively for general overuse, general harm, specific necessity and specific concern. Crobach alpha coefficient was .82 for Hypertension Self-Efficacy Scale and .91 for Multi-diminensional Scale of Perceived Social Support (MSPSS). Reliability of Hypertension Knowledge-Level Scale (HK-LS) was assessed applying Kuder-Richardson's formula which generated reliability coefficient of .81. Overall, all the scales used for the research were reliable.

Ethical consideration

The research proposal was submitted to Institutional Review Board (IRB) of Burapha University, Thailand. Once the proposal is endorsed by the university IRB (Certificate number 005/2020), it was forwarded to Research Ethic Board of Health, Ministry of Health, Thimphu, Bhutan for further review and approval. Following the endorsement from national IRB (Ref. No. REBH/Approval/2020/024), explicit permission to conduct study was obtained from the clinical agency (Punakha District Hospital).

Recruitment of participants was carried out purely on the basis of volunteerism. Only those participants who were willing and consented to take part in the study were recruited. The participants were provided with pertinent information concerning the study. They were informed that their participation was voluntary and could withdraw from the study at any time without any penalty. In addition, they were clarified that their refusal to engage in the study won't in any form affect or deprive them of their constitutional rights to avail free healthcare services. All the participants who agreed to participate in the study were requested to sign consent form.

All data obtained from the study were kept strictly confidential. The participant's name was not reflected in the questionnaire and instead code number was used. Once the data were punched on the statistical software, hard copy of the data was securely treasured under lock and key. Similarly, the soft file was saved in password protected computer. No unauthorized personal were accessible to the data except researcher and the major advisor. Findings of the study was reported as a group data without disclosing individual characteristics. The data would be destroyed after publication of the result.

Data collection procedure

Data collection was carried out at Punakha District Hospital once explicit permission and approval was granted from the relevant stakeholders. Following steps were embraced while collecting data.

1. The researcher approached the head of clinical agency to seek permission to collect data from persons with hypertension.

2. After getting permission from the head of clinical agency, the researcher met the clinicians and nurses working at NCD clinic to apprise them of data collection.

3. The researcher introduced himself to the potential research participants fulfilling the inclusion criteria. The potential participants were explained on purpose, benefits, potential risk and their role in the study.

4. The researcher recruited those subjects who were willing and volunteered to take part in the study by following simple random technique.

5. Data collection was carried out based on the convenience of the subjects especially after being examined by the clinicians at the NCD clinic.

6. Physical measurements like blood pressure, height and weight of the patients were recorded from patient's medical record.

7. Each subject was escorted to suitable room arranged by the researcher for data collection. They were given at least five minutes to rest after which the questionnaires were distributed.

8. The researcher provided instructions on how to respond to the questionnaires. The subjects were allowed to ask for any clarification while responding to the questionnaire if necessary.

9. The approximate time required to complete the questionnaire was 30 to 40 minutes.

10. Finally, the researcher checked each filled in questionnaire for completeness of information before allowing subjects to leave.

In order to maintain quality of data collection, only 5 to 8 participants were recruited per day. A total of 108 sets of questionnaires were administered to the participants. All questionnaires were completed and returned with 100% return rate.

Data analysis

The data were coded and entered into Statistical Software Package (Minitab 17) for analysis. Statistical significance was set at alpha level of .05. Following statistical procedures were carried out for analysis of data:

1. The data were tested to examine fulfillment of assumptions required for running standard multiple regression test such as normality of data, presence for

homoscedasticity and linearity, outliers, autocorrelation, and absence of multicol-linearity (Plichta & Kelvin, 2013).

2. Descriptive statistics including frequency, percentage, mean (M) and standard division (SD) were used to describe demographic characteristics, independent variables and dependent variables.

3. Standard multiple regression applying enter method was run to examine predictors of lifestyle modification which included hypertension knowledge, belief about medicine, perceived self-efficacy and perceived social support.

CHAPTER 4
RESULTS

This chapter presents the results of the data analysis which are described under three sections: demographic characteristics and health information of the participants, description of lifestyle modifications and the predicting factors of lifestyle modification.

Demographic characteristics and health information.

1. Demographic characteristics

Demographic characteristics of the participants are illustrated in table 1.

Table 1 Frequency, percentage, mean, and standard division of demographic characteristics of the participants (n = 108)

Characteristics	Number (n)	Percentage (%)
Age		
20-30 years	2	1.9
31-40 years	20	18.5
41-50 years	35	32.4
51-60 years	51	47.2
(M = 49.3, SD = 8.4, min = 28, max = 60)		
Gender		
Male	63	58.3
Female	45	41.7
Marital status		
Married	93	86.1
Unmarried	3	2.8
Divorced/separated/widowed	12	11.1

Table 1 (Continued)

Characteristics	Number (n)	Percentage (%)
Education		
Primary School	36	33.3
Secondary School	23	21.3
High school	26	24.1
Diploma	7	6.5
Bachelor or higher	16	14.8
Employment status		
Employed	60	55.6
Unemployed	38	35.2
Retired	10	9.2
Family income per month in Nu (Nu.76 = 1 USD)		
Less than Nu.10,000	14	12.9
Nu. 10,000 to Nu.20,000	40	37.1
Nu.20,000 to Nu. 30,000	18	16.7
Nu. 30,000 to Nu. 40,000	20	18.5
Nu.40,000 and above	16	14.8
Income adequacy		
Adequate	86	79.6
Inadequate	22	20.4

Table 1 (Continued)

Characteristics	Number (n)	Percentage (%)
Source of information on hypertension *		
Health professionals	90	45.0
Television	58	29.0
Printed documents	15	7.5
Newspaper	12	6.0
Radio	11	5.5
Others (social media and internet)	14	7.0
History of attending hypertension awareness program		
Yes	29	26.8
No	79	73.2
Smoke cigarette		
Yes	3	2.8
No	105	97.2
Smoked cigarette in the past		
Yes	25	23.0
No	83	77.0
Drink alcohol		
Yes	24	22.2
No	84	77.8
Drank alcohol in the past		
Yes	32	29.6
No	76	70.4

* can answer more than 1 items

Table 1 showed that more than half of participants were male comprising 58.3%. Age of the participants ranged from 28-60 years with mean age of 49.3. Majority of the participants were in the age bracket of 51-60 years consisting of 47.2%. Most of participants were married (86.1%) and more than half (55.6%) were

employed. Majority (37.1%) of participants earned monthly family income of Nu.10,000 - Nu.20,000 ($ 130 - $ 260) with 79.6% of the participants disclosing it as adequate. While 45% of the participants acquired information on hypertension from health professional, only 26.8% had attended hypertension awareness program. Only a small minority of 2.8% were current smoker while 23% were past smoker. Less than a quarter of the participants (22.2%) currently drink alcohol while 29.6% drank in the past.

2. Health information of the participants

Health information of the participants consisting of comorbidities, body mass index (BMI), duration since diagnosis of hypertension, number of antihypertensive medications and history of taking traditional medicine to control blood pressure are presented in table 2.

Table 2 Frequency, percentage, mean and standard division of health information of the participants (*n* = 108)

Health information	Number (n)	Percent (%)
Comorbidities		
No	77	71.3
Yes	31	28.7
Diabetes	21	19.4
Heart disease	8	7.4
Others (gastritis & sinusitis)	2	1.9
Blood pressure (BP)		
Normal blood pressure: Systolic blood pressure(SBP) < 120 & Diastolic blood pressure (DBP) <80 mmHg.	13	10.7
Elevated SBP >120-129 & DBP < 80 mmHg	18	14.9
Hypertension stage1 SBP: 130-139 or DBP 80-89 mmHg	40	33.1

Table 2 (Continued)

Health information	Number (n)	Percent (%)
Hypertension stage 2: SBP ≥140 or DBP ≥ 90 mmHg	50	41.3
Controlled blood pressure (< 140/90 mmHg)	64	59.3
Uncontrolled blood pressure (≥ 140/90 mmHg)	44	40.7
Body mass index (BMI)		
< 18.5	2	1.9
18.5 to 24.9	28	25.9
25 to 29.9	58	53.7
≥ 30	20	18.5
(*M* = 27.1, *SD* = 4, min = 16.7, max =38.2)		
Duration of hypertension in years		
Less than 1 year	4	3.7
1-5 years	64	59.3
> 6 years	40	37.0
(M = 5.5, SD = 4.9, min = .5, max = 30)		
Number of antihypertensive medications		
1	66	61.1
≥2	42	38.9
Took traditional (herbal) medicine to control BP		
Yes	7	6.5
No	101	93.5

As illustrated in table 2 significant portion of participants did not have any other medical conditions. Only 28.7% reported having some form of comorbidities with diabetes ranked on the top with 19.4%. Of the total participants, 10.7% had normal blood pressure of <120/80 mmHg, 14.9% had elevated blood pressure, 33.1% had stage1 hypertension and 41.3% had stage2 hypertension (Whelton et al, 2018). This staging of blood pressure indicates that 85.1% of the participants are at the

higher risk for cardiovascular disease, end-stage renal disease, subclinical atherosclerosis and all-cause death (Whelton et al, 2018). Overall 59.3% of the participants had their blood pressure controlled, while 40.7% had uncontrolled blood pressure (JNC7, 2003). The mean body mass index was 27.1 (*SD* = 4) with 53.7% overweight (BMI 25 to 29.9) and 18.5% obese (BMI $\geq$ 30) which is as per the definition provided by Center for Disease Control (CDC) 2016. 59.3% of the participants were diagnosed with hypertension within the span of 1-5 years. While 61.1% of the participants were on lone antihypertensive medications, 38.9% were on more than one antihypertensive medication. Not many participants took traditional medicines to manage blood pressure with only 6.5% reported to have resorted to such practice.

Description of lifestyle modification

Lifestyle modification consist of ingestion of healthy diet, physical activity, weight reduction, moderation in alcohol consumption, cessation of smoking, adherence to prescribed medication and stress management. Table 3 illustrates lifestyle modification reported by the participants.

Table 3 Range, mean and standard division of lifestyle modification among the participants (*n* = 108)

Lifestyle modification	Range		*M*	*SD*
	Possible score	Actual score		
Lifestyle modification	20-80	33-71	53.9(2.7*)	7.7
- Healthy diet	10-40	14-39	26.55(2.7*)	.05
- Physical activity	1-4	1-4	2.7	.99
- Weight reduction	1-4	1-4	2.6	.90
- Moderation in alcohol consumption	1-4	1-4	2.9	1.26
- Cessation of smoking	1-4	1-4	3.3	1.19
- Stress management	2-8	2-8	5.32(2.7*)	1.45
- Medication adherent	4-16	5-16	10.6(2.7*)	2.04

*is the mean score which is calculated from score range of 1-4.

As presented in table 3, the participants occasionally practiced lifestyle modification [M = 53.9 (2.7), SD = 7.7]. Mean score of each dimensions of lifestyle modification also revealed that the participants occasionally practiced physical activity, healthy diet, weight reduction, moderation in alcohol consumption, stress management, and medication adherent (M = 2.6-2.9). However, mean score in the dimension of cessation of smoking (M = 3.3) was slightly higher than other dimensions of lifestyle modification. Also as reflected in table 4, half of the participants scored greater than or equal to mean score implying that 50% of the participants had high level of lifestyle modification.

Table 4 Mean, frequency, percent and level of lifestyle modification among the participants (*n* = 108)

Mean score of lifestyle modification	Number(n)	Percent(%)	Level of lifestyle modification
≥ 53.9	54	50	High
< 53.9	54	50	Low

Predicting factors of lifestyle modification

Predicting factors of lifestyle modification consisted of hypertension knowledge, belief about medicine, perceived self-efficacy and perceived social support which are presented in table 5.

Table 5 showed the mean score of hypertension knowledge was 16.6 and standard deviation of 2.7 indicating fair hypertension knowledge. Mean score of perceived self-efficacy was 7.4 (*SD* = 1.9) showing poor perceived self-efficacy. Similarly mean score and standard deviation of perceived social support were 5.2 and 1.1 respectively showing high social support. Mean score of belief about medicine was 53.6 (*SD* = 9.3) and demonstrate positive belief about medicine. Belief about medicine is broadly categorized into general and specific belief. It indicated that the participants had more negative opinion on drug prescription (*M* = 11.3, *SD* = 3.6), positive perspective on drugs (*M* = 9.0, *SD* = 3.2), stronger perception to use drugs (*M* = 18.9, *SD* = 4) and more concern about the adverse effect of drugs (*M* = 14.4, *SD* = 4.6).

Table 5 Possible score, actual score, mean, standard division and meaning of hypertension knowledge, belief about medicine, perceived self-efficacy and perceived social support (n = 108)

Variables	Range		*M*	*SD*	Meaning
	Possible score	**Actual score**			
HK	0-22	10-22	16.6 (75.5%)	2.7	Fair
PSE	1-10	4-10	7.4	1.9	Poor
PSS	1-7	2-7	5.2	1.1	High
BAM	18-90	33-80	53.60	9.3	Positive
GO	4-20	5-20	11.3	3.6	More negative opinion on drug prescription
GH	4-20	4-20	9.0	3.2	Positive perspective on drugs
SN	5-25	8-25	18.9	4.0	Stronger perception to use drug
SC	5-25	5-25	14.4	4.6	More concern about adverse effect of drug

Abbreviation: HK = Hypertension knowledge, PSE = Perceived self-efficacy, PSS = Perceived social support, BAM = Belief about medicine, GO = General overuse, GH = General harm, SN = Specific necessity, SC = Specific concern

Pearson's correlation test was performed to examine the relationship between lifestyle modification, hypertension knowledge, belief about medicine, perceived self-efficacy and perceived social support. Table 6 shows correlation of the studied variables.

From the correlation matrix, lifestyle modification was significantly correlated with hypertension knowledge (r = .27, p < .01), perceived self-efficacy (r = .43, p < .001) and perceived social support (r = .26, p < .01). However, it was not significantly correlated with belief about medicine (r = -.01, p = .96).

Table 6 Correlation matrix among the variables (n = 108)

	HK	**BAM**	**PSE**	**PSS**	**LSM**
HK	1.00				
BAM	-.04	1.00			
PSE	.20*	.001	1.00		
PSS	.11	.03	.36***	1.00	
LSM	.27**	-.01	.43***	.26**	1.00

* p <.05, ** p<.01, *** p <.001

Abbreviation: HK = Hypertension knowledge, BAM = Belief about medicine, PSE = Perceived self-efficacy, PSS = Perceived social support, LSM = lifestyle modification.

To determine the predictors of lifestyle modification, standard multiple regression was performed. All assumptions for standard multiple regression such as normality of independent variables and dependent variables, linearity and homoscedasticity, multivariate outliers, autocorrelation and multicollinearity (Plichta & Kelvin, 2013) was performed. Anderson-Darling normality test was run to determine normality of the study variables and showed that all the variables had p value more than .05 indicating normality. Durbin-Watson test was performed to test for autocorrelation. The result showed Durbin-Watson statistics value of 1.96 which lies between normal value of 1.5-2.5 indicating absence of autocorrelation. Leverage values of .01-.11 and Cook's distance of .00-.15 indicated absence of multivariate outliers. F test generated p value of less than .05 showing linearity between dependent and independent variables. Scatter plot also indicates linearity and homoscedasticity. Variance Inflation Factors were all below 2 which show absence of multicollinearity among the predicting factors. However, since belief about medicine was not significantly correlated to lifestyle modification, it was not entered into the regression model. The results of standard multiple regression test are illustrated in table 7

Table 7 Predicting factors of lifestyle modification among the participants (n = 108)

Predicting variables	***B***	***SE***	***β***	***t***	***p value***
Hypertension knowledge	.54	.25	.19	2.11	.04
Perceived self-efficacy	.40	.10	.36	3.85	< .001
Perceived social support	.06	.10	.11	1.14	.26
Constant = 27.14, $p < .001$, $R^2 = .23$ R^2(adj) = .21; $F_{(3, 104)} = 10.51$					

Table 7 showed that hypertension knowledge, perceived self-efficacy and perceived social support explained 21.05% of variance in lifestyle modification ($F_{3, 104} = 10.51$, $p < .001$). However, only hypertension knowledge ($\beta = .19$, $p = .04$ and perceived self-efficacy ($\beta = .36$, $p < .001$) significantly explained the variance in lifestyle modification. Of the two significant predictors, hypertension knowledge better explained the variance in lifestyle modification followed by perceived self-efficacy. Perceived social support did not significantly explain variance in lifestyle modification ($\beta = .11$, $p = .26$).

CHAPTER 5
CONCLUSION AND DISCUSSION

This chapter delineates a summary and discussion of the study results, conclusion, implication and recommendation for future research.

Summary of the study

This study aimed to describe lifestyle modification and to examine the predicting factors of lifestyle modification among persons with hypertension in Punakha, Bhutan. Individual and family self-management theory was used as a conceptual framework to guide the study. Simple random technique was applied to recruit 108 participants from non-communicable disease (NCD) unit of Punakha District Hospital, Bhutan. Data was collected using self-reported questionnaires which include Demographic Questionnaire, Hypertension Self-care Profile Behavior Scale (Han, Lee, Commodore-Mensah & Kim, 2014), Hypertension Knowledge-Level Scale (Erkoc, Isikli, Metintas & Kalyoncu, 2012), Belief About Medicine Questionnaire (Horne, Weinman & Hankins, 1999), Hypertension Self-efficacy Scale (Warren-Findlow, Seymour & Huber, 2012), and Multi-Diminensional Scale of Perceived Social Support (Zimet, Dahlem, Zimet & Farely,1988).

The findings revealed that age group of the participants were in the range of 28-60 years with mean age of 49.3. Majority of the participants were 51-61 years old at 47.2%, married (86.1%), and employed (55.6%). Majority of the participants reported their monthly family income of Nu.10,000-Nu.20,000 ($ 131.5-$ 263.2). Most of the participants received hypertension related information from healthcare providers. A number of participants who attended hypertension awareness program were marginally low with 26.8%. While 22.2% of the participants currently drink alcohol, only 2.8% smoke cigarette. Past history of smoking and drinking alcohol were reported by 23% and 29.6% of the participants respectively.

In terms of health-related information, 28.7% had comorbidities with diabetes ranked at the top (19.4%). Negligibly 6.5% of the participants resorted to traditional medicines to control blood pressure. 40.7% of the participants had

uncontrollable blood pressure of ≥140/90 mmHg. Body mass index indicates 53.7% were overweight and 18.5% obese. Nearly 60% of the participants reported 1-5 years as a duration since diagnosis of hypertension. Minimum duration since diagnosis of hypertension reported was 7 months. While 38.9% were on two or more antihypertensive medicine, 61.1% were on lone antihypertensive therapy.

The mean score and standard deviation of lifestyle modification was 53.9 and 7.7 respectively indicating that the participants occasionally practiced lifestyle modification. Mean score of each dimensions of lifestyle modification also revealed that the participants occasionally practiced physical activity, healthy diet, weight reduction, moderation in alcohol consumption, stress management, and medication adherent (M = 2.6-2.9). However, mean score in the dimension of cessation of smoking (M = 3.3) was slightly higher than other dimensions of lifestyle modification**.** Also as illustrated in appendix A, only 20.4% of the participants always took part in the regular physical activity; 32.4% always consumed less than 1 teaspoon of table salt per day and 32.4% always ate less fatty foods. While only 8.3% always consumed 5 or more serving of fruits and vegetables daily, 50.9% always practiced none or moderation in alcohol intake. Nearly 17% always engaged in weight reduction and 12% always took part in activities to lower the stress. Close to three quarter (72.2%) always practiced non-smoking.

The result also indicated that the participants had fair hypertension knowledge, poor self-efficacy and high social support. With regards to belief about medicine, the participants demonstrated more negative opinion on drug prescription, positive perspective on drugs, stronger perception to use drugs and more concern about adverse effects of drug. Standard multiple regression analysis result showed that lifestyle modification among the hypertensive patients was predicted by hypertension knowledge (β = .19, p = .04) and perceived self-efficacy (β = .36, p < .001). Perceived social support did not significantly predict lifestyle modification. All the predictors explained 21.05% of variance in lifestyle modification (R^2adj = .21, $F_{3, 104}$ = 10.51, p < .001).

Discussion

The discussions of the findings were presented based on objectives and hypothesis of the study. The first objective was to describe lifestyle modification and the second was to examine the factors predicting lifestyle modification among persons with hypertension in Punakha, Bhutan.

Lifestyle modification

Findings of the study indicate that the participants occasionally practiced lifestyle modification (M = 53.9, SD = 7.7). The reasons for this findings can be enumerated in terms of national health policy and demographic characteristics of the participants.

At the policy level, the Royal Government of Bhutan had accorded the highest consideration to combat growing burden of non-communicable disease in Bhutan. One of the national strategies instituted by the Ministry of Health of Bhutan was implementation of WHO PEN program across many healthcare centers (Thinley et al, 2017). This novel program ensures that all the adult population are screened for risk factors of non-communicable diseases (NCD) and all the patients suffering from NCD are periodically monitored and followed. The program also mandates provision of health education and counseling for the patients with hypertension and other non-communicable diseases. Based on individual and family self-management theory this program will magnetize individual's engagement in lifestyle modification by enabling conducive physical and social environment and by enhancing their understanding about the condition and its management (Ryan & Sawin, 2009). However, to ensure that persons with hypertension always practice healthy self-care behaviour, continuous motivation, monitoring and evaluation of lifestyle modification is indispensible.

Socioeconomic characteristics of the participants might have also played pivotal role in promoting lifestyle modification in this study. Our study showed that 86.1% of the participants were married. Marital status is reported to influence lifestyle modification wherein the married participants demonstrated better lifestyle modification compared to their unmarried counterpart (Labata, Ahmed, Mekonen, & Daba, 2017). Such positive impact of marriage on lifestyle modification could be due to material, informational and emotional support they received from their partners

(Ryan & Sawin, 2009; Adamczyk, & Segrin, 2015). Employment status might also contributed for better lifestyle modification practice in the current study since 56.5% of the samples were employed. According to Ryan and Sawin (2009), physical and social enviroment such as work is related to engagement in lifestyle modification. A study also shows those who are employed are adherent to lifestyle recommendation compared to those who are unemployed (Tibebu, Mengistu, & Negesa, 2017) as they are more likely to gain support and information from the work place.

High level of lifestyle modification among half of the participants in the current study can also be explained in terms of educational status and chronic nature of disease.. All the participants in the current study had formal education ranging from primary to graduate level. Literacy or education directly impacts lifestyle modification or indirectly by influencing self-management process (Ryan & Sawin, 2009). Literature indicates some degree of association between education and lifestyle modification wherein educated are more likely to adhere to lifestyle modification compared to their uneducated counterpart. A study conducted in Indonesia showed that education was a significant predicting factors of lifestyle modification (β = .11, p < .01) among older adults with hypertension (Giena, Thongpat, & Nitirat, 2018). The possible explanation for such association is that educated participants are willing to seek information and are exposed to various sources of health-related information (Wangdi & Jamtsho, 2019). It is also easy for them to understand about hypertension and healthy lifestyle.

As enshrined in individual and family self-management theory, longer duration since diagnosis of hypertension is a condition specific factor which might have directly or indirectly promoted lifestyle modification (Ryan & Sawin, 2009) in the present study. Our study indicates that 37% of the participants had duration of hypertension of 6 years or more. Longer duration of being hypertensive could have provided the participants with the platform to gain more health recommendations and counseling from healthcare providers as they have to periodically visit health center for follow up (Buda, Hanfore, Fite, & Buda, 2017). A study conducted in Iran reported that patients diagnosed with hypertension for more than five years were more adherent to physical activity (OR = .73) (Motlagh, Chaman, Sadeghi, & Eslami, 2016). It is also known that as disease progresses indefinitely throughout the life, the

patients gain considerable experiences and knowledge which facilitate them to engross in lifestyle modification.

However, 40.7% of the participants had uncontrolled blood pressure of ≥ 140/90 mmHg in the present study which could be mainly due to the fact that 62% of the participants did not take medication regularly. In addition culturally inherited dietary habit of Bhutanese population consisting of high carbohydrate diet consumed three times a day (Thinley et al, 2017) is an important factor which might have also contributed to excessive weight gain resulting in increased blood pressure (WHO, 2018) as 53.7% of the participants in the study were overweight. Weight reduction (Lochner, Rugge & Judkins, 2006), stress management (Spruill et al., 2019) and salt reduction (Feyh, 2017) are reported to control blood pressure. However, adherence to these dimensions of lifestyle modification is low among the participants in the current study.

It is also evident that only 20.4% of the participants always took part in regular physical activity indicating that 79.6% were non-adherent to physical activity. Less than a tenth (8.3%) read nutritional facts to check sodium content showing that majority were not aware of impact of sodium on blood pressure. Majority of the participants consumed traditional high salt food with only 17.6% reported to have replaced it with low salt products. Only 10.1% always read nutritional facts to check fat contents and 16.7% always replaced high fatty foods with low fat products. Similarly, only 8.3% reported consuming five or more serving of fruits and vegetable on daily basis. While majority practiced non-smoking (72.2%) and moderation in alcohol intake (50.9%), only 16.7% engaged in weight reduction. It is also interesting to note that only 12% engaged in the activities to lower the stress.

Another possible explanation for prevalence of uncontrolled blood pressure among large number of participants in the present study could be attributed to more number of male participants. Gender-specific perspective and social norms may challenge or facilitate engagement in lifestyle modification (Ryan & Sawin, 2009). A study indicates that males are more prone for uncontrolled blood pressure as their compliance to lifestyle modification is low compared to female counterpart (Everett & Zajacova, 2015). Similarly, a study by Kim & Kong (2015) showed that males are 1.9 times unlikely to follow recommended lifestyle modification compared to the

females. This holds true for Bhutan where men are more likely to drink alcohol and smoke compared to their women counterpart (Ministry of Health, 2015).

To achieve effective control of blood pressure the patients must be encouraged and motivated to engage in lifestyle modification through hypertension awareness and educational program. Organizing such program is crucial as it can help the patients in gaining the best and correct information which can help dispel their myths and misconception related to disease and its management. However, our data showed that only 26.8% of the participants took part in hypertension awareness program. Therefore, the program should be planned and designed in such a way to reach all the targeted audiences including their family members.

Factors predicting lifestyle modification

The findings of the study revealed that lifestyle modification among persons with hypertension in Bhutan was predicted by hypertension knowledge (β = .19, p = .04) and perceived self-efficacy (β = .36, p < .001) which is in line with the objective of the study. However, perceived social support (β = .11, p = .26) was not the significant predictor of lifestyle modification in this study which is in contrast to the research hypothesis. All the predictors explained 21.05% of variance in lifestyle modification.

In consistent with the hypothesis of the study, hypertension knowledge significantly predicted lifestyle modification among persons with hypertension in Bhutan. Hypertensive knowledge is defined as ability of the patients with hypertension to understand factual information about hypertension such as definition of hypertension, etiology, medical treatment and complication of hypertension, as well as attitude and behavior about drug compliance, diet and lifestyle (Erkoc, Isikli, Metintas & Kalyoncu, 2012). According individual and family management theory which was used as a theoretical framework for the study, knowledge which corresponds to hypertension knowledge influences lifestyle modification by modulating behavior specific self-efficacy, outcome expectancy and goal congruence (Ryan & Sawin, 2009). The theory also postulated that knowledge influences engagement in self-regulation behavior such as goal setting, planning and action, self-monitoring and reflective thinking, decision making and self evaluation, which ultimately impact individual's engagement in lifestyle modification. Possession of

good hypertension knowledge is reported to positively influence patients perception about management of hypertension while lack of it can negatively alter illness respresentation of the patients (Erkoc, Isikli, Metintas & Kalyoncu, 2012) which result in poor lifestyle modification.

Hypertension knowledge which significantly predicted lifestyle modification in the current study can be explained by the fact that Ministry of Health, Royal Government of Bhutan has accorded extra-ordinary priority to confront growing burden of hypertension and other non-communicable disease (NCD). One such initiative was reformation and amendment of national health policy which mandates people-centred approach in management of NCD (Thinley et al, 2017) thus strengthening physical and social environment to engage in lifestyle modification (Ryan & Sawin, 2009). This program ensure that the patients are knowledgeable on various aspects of disease such as causes, risk factors and management approach. As patients gain deeper understanding about disease and its management, they are more likely to engage in lifestyle modification (Akoko, Fon, Ngu, Ngu, & Ngu, 2016).

The finding of our study is in congruence with those of the previous studies. A study demonstrated that hypertension knowledge predicted 8.1% of variance in practice of lifestyle modification among the cohort of hypertensive patients ($\beta = .28$, $p < .01$) (Jandeekaewsakul, Watthayu, & Suwonnaroop, 2018). Similarly, a study in Cameroon reported that those participants with high level of hypertension knowledge are 2.9 times likely to comply with lifestyle modification practice compared to those with low hypertension knowledge (Akoko, Fon, Ngu, Ngu, & Ngu, 2016).

In consistent with our research hypothesis, perceived self-efficacy is another factor which significantly predicted lifestyle modification in the current study. Theoretically, it is hypothesized that behavior specific self-efficacy primarily influence the proximal outcome – lifestyle modification (Ryan & Sawin, 2009). The studies also indicate that perceived self-efficacy motivate the patients directly by leveling the expectations for behavior changes (Giena, Thongpat, & Nitirat, 2018) and indirectly by eliminating perceived barriers to action and/or increasing their commitment to the plan of action (Pender, Murdaugh & Parsons, 2015). If hypertensive patients are assured that hypertension is controllable and that their

capability to carry out lifestyle modification is sufficient, then their likelihood of engaging in lifestyle modification will increase (Giena, Thongpat, & Nitirat, 2018).

Fingings from other studies also support those of the present study. A cross-sectional study comprising of 333 older adults with hypertension reported self-efficacy as the strongest predictor of lifestyle modification (β = .32, p < .001) (Giena,Thongpat, & Nitirat, 2018). A study in Ethiopia also showed that those participants with high level of self-efficacy were 2.6 times more likely (AOR = 2.58, 95% CI: 1.41-4.73) to engage in weight management behavior than those with low self-efficacy (Labata, Ahmed, Mekonen, & Daba, 2017). Similarly, a compliance to lifestyle modification was four times higher among those with high self-efficacy than those with low self-efficacy ((Tibebu et al., 2017).

Likewise, perceived social support is one of the factors which is reported as the a potent predictor of lifestyle modification in the previous studies. Perceived social support include instrumental, informational and emotional support received from family, friends and significant others (Ryan & Sawin, 2009). According to Ryan and Sawin (2009) it is assumed that social facilitation such as presence of perceived social support can direct, encourage and support individual and family's engagement in self-management behavior (Ryan & Sawin, 2009).

Perceived social support was high among the participants in this study. However, it did not significantly predict lifestyle modification among persons with hypertension in Bhutan. This finding is in contrast with our research hypothesis and previous literatures. The previous study showed that perceived social support predicted 15.10% of variance in self-management behavior among the cohort of hypertensive patients (β = .36, p < .001) (Jandeekaewsakul, Watthayu, & Suwonnaroop, 2018). A similar study conducted in Ethiopia also reported remarkable association between perceived social support and adherence to low salt diet (AOR=2.81, 95% CI:1.20 – 6.53) (Labata, Ahmed, Mekonen, & Daba, 2017). In addition, individuals with good social support were shown more likely to adopt lifestyle modification (AOR = 2.20, 95% CI: 1.27 - 3.82, p < 0.01) compared to their counterpart (Ademe, Aga, & Gela 2019).

The possible explanation for perceived social support not predicting lifestyle modification can be attributed to deeply rooted Buddhist belief which defines the way

of life in Bhutan.Buddhism strongly embraces love, compasssion, care and social cohesion among the people. Prevalence of joint family also ensures high level of social support among the Bhutanese population (Leaming, 2004). Therefore, in Bhutanese context social support can be considered as a naturally occurring phenomenon emanating from its intricately woven pattern of spiritualism, culture and tradition. Thus social support as a ritualistic norm failed to predict lifestyle modification among persons with hypertension in Bhutan.

Further, since the instrument which measured perceived social support is based on western culture it might be culturally incongruent to the Bhutanese way of life. As a consequence, it is probable that the instrument did not capture factual perception of social support among the participants thus limiting its potential to predict lifestyle modification.

Conclusion

The study revealed high level of lifestyle modification among the half of the participants. However another half of the participants had lifestyle modification score lower than mean score with considerable number of participants presented with uncontrolled blood pressure. This underscore the importance of further consolidating lifestyle modification especially in the area of diet, salt reduction, physical activity and weight reduction. The interventional program should be strategically targeted to enhance hypertension knowledge and perceived self-efficacy among persons with hypertension.

Implications for nursing practice

Findings of the current study might be useful in the following areas:

1. Nursing practice

The findings of the study provided deeper insight regarding lifestyle modification and its predicting factors among persons with hypertension in Punakha, Bhutan. This information can be useful in developing appropriate nursing intervention to foster lifestyle modification among hypertensive patients by targeting on

hypertension knowledge and perceived self-efficacy to control blood pressure and to prevent untoward complications.

2. Nursing education

It can also be useful for nurse educator to enhance nursing student's knowledge on non-pharmacological approach of managing hypertension.

3. Health policy

The need to manage chronic diseases and to adopt lifestyle modification to promote health is recognized as the collective responsibility of individual and their family. In the light of above, there should be provision in health policy which mandates that individual patient is adequately counseled on fundamental aspects of lifestyle modification and their significance in promotion of health. The health system should also promotes home visit by healthcare professionals to encourage and motivate both individual and family to engage in lifestyle modification.

Recommendations for future research

Since the study was conducted in a single setting the it must be acknowledged that the findings may not represent all the characteristics of Bhutanese patients with hypertension. For the purpose of generalization of results among Bhutanese hypertensive population, we recommend replicating the study in multiple settings. Future study should explore appropriate interventional program to promote high level of lifestyle modification among persons with hypertension in Bhutan.

REFERENCES

Adamczyk, K., & Segrin, C. (2015). Perceived social support and mental health among single vs. partnered Polish young adults. *Current Psychology, 34*(1), 82-96.

Ademe, S., Aga, F., & Gela, D. (2019). Hypertension self-care practice and associated factors among patients in public health facilities of Dessie town, Ethiopia. *BMC Health Services Research, 19*(1), 51.

Adhikari, D. (2016). Healthcare and happiness in the Kingdom of Bhutan. *Singapore Medical Journal, 57*(3), 107.

Adidja, N.M., Agbor, V.N., Aminde, J.A. (2018). Non-adherence to antihypertensive pharmacotherapy in Buea, Cameroon: A cross-sectional community-based study. *BMC Cardiovasc Disord, 18*, 150. https://doi.org/10.1186/s12872-018-0888-z

Akoko, B. M., Fon, P. N., Ngu, R. C., & Ngu, K. B. (2017). Knowledge of hypertension and compliance with therapy among hypertensive patients in the Bamenda health district of Cameroon: A cross-sectional study. *Cardiology and Therapy, 6*(1), 53-67.

Alefan, Q., Huwari, D., Alshogran, O. Y., & Jarrah, M. I. (2019). Factors affecting hypertensive patients' compliance with healthy lifestyle. *Patient Preference and Adherence, 13*, 577.

AlHadlaq, R. K., Swarelzahab, M. M., AlSaad, S. Z., AlHadlaq, A. K., Almasari, S. M., Alsuwayt, S. S., & Alomari, N. A. (2019). Factors affecting self-management of hypertensive patients attending family medicine clinics in Riyadh, Saudi Arabia. *Journal of Family Medicine and Primary Care, 8*(12), 403-409

Alhalaiqa, F., Al-Nawafleh, A., Batiha, A. M., Masa'deh, R., & Alrazek, A. A. (2017). A descriptive study of adherence to lifestyle modification factors among hypertensive patients. *Turkish Journal Of Medical Sciences, 47*(1), 273-281.

Alsaigh, S. A. S., Alanazi, M. D., & Alkahtani, M. A. (2018). Lifestyle modifications for hypertension management. *The Egyptian Journal of Hospital Medicine, 70*(12), 2152-2156. doi:10.12816/0045044

American Heart Association & American Stroke Association. (2013). *Statistical fact-sheet 2013 update: High blood pressure*. Retrieved from www.heart. .org/idc/groups/heart-public/ @wcm/@sop/@smd/documents/downloadable/ucm_319587

American Heart Association. (2015). *Why should I lose weight?* Retrieved from https://www.heart.org/-/media/data-import/downloadables/pe-abh-why-should-i-lose-weight-ucm_300472.pdf

Arredondo, A., & Avilés, R. (2014). Hypertension and its effects on the economy of the health system for patients and society: Suggestions for developing countries. *American Journal of Hypertension, 27*(4), 635-636. doi:10.1093/ajh/hpu010

Benjamin, E. J., Virani, S. S., Callaway, C. W., Chamberlain, A. M., Chang, A. R., Cheng, S., & Deo, R. (2018). Heart disease and stroke statistics-2018 update: A report from the American Heart Association. *Circulation, 137*(12), e67.

Bhise, M. D., & Patra, S. (2018). Prevalence and correlates of hypertension in Maharashtra, India: A multilevel analysis. *Public Library of Science, 13*(2), 1-17. doi:10.1371/journal.pone.0191948

Bloch, M. J., & Basile, F. J. (2018). Cardiovascular risks of hypertension. Retreived from http://www.uptodate.com/contents/cardiovascular-risks-of-hypertension/print

Brehm, B. J., Seeley, R. J., Daniels, S. R., & D'Alessio, D. A. (2003). A randomized trial comparing a very low carbohydrate diet and a calorie-restricted low fat diet on body weight and cardiovascular risk factors in healthy women. *Journal of Clinical Endocrinology and Metabolism, 88*(4), 1617-1623. doi:10.1210/jc.2002-021480

Bruno, C. M, Amaradio, M. D., Pricoco, G., Marino, E., & Bruno, F. (2018).. Lifestyle and hypertension: An evidence-based review. *Journal of Hypertension and Management, 4*(1). doi:10.23937/2474-3690/1510030

Buda, E. S., Hanfore, L. K., Fite, R. O., & Buda, A. S. (2017). Lifestyle modification practice and associated factors among diagnosed hypertensive patients in selected hospitals, South Ethiopia. *Clinical Hypertension, 23*(1), 26.

Carey, R. M., Muntner, P., Bosworth, H. B., & Whelton, P. K. (2018). Prevention and control of hypertension: JACC health promotion series. *Journal of the American College of Cardiology, 72*(11), 1278-1293. doi:https://doi.org/10.1016/j.jacc.2018.07.008

Carvalho, M. V. d., Siqueira, L. B., Sousa, A. L. L., & Jardim, P. C. B. V. (2013). A influência da hipertensão arterial na qualidade de vida. *Arquivos Brasileiros de Cardiologia, 100*, 164-174.

Chobanian, A. V., Bakris, G. L., Black, H. R., Cushman, W. C., Green, L. A., Izzo Jr, J. L., & Roccella, E. J. (2003). The seventh report of the joint national committee on prevention, detection, evaluation, and treatment of high blood pressure: The JNC 7 report. *The Journal of the American Medical Association*, *289*(19), 2560-2571.

Clark, M. J., & Slavin, J. L. (2013). The effect of fiber on satiety and food intake: A systematic review. *Journal of American College of Nutrition, 32*(3), 200-211. doi:10.1080/07315724.2013.791194

Cohen, S., & Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychological Bulletin*, *98*(2), 310.

Collaborators, G. R. F. (2018). Global, regional, and national comparative risk assessment of 84 behavioural, environmental and occupational, and metabolic risks or clusters of risks for 195 countries and territories, 1990-2017. *National Library of Medicine, 392*(10159), 1923-1994.

Dar, T., Radfar, A., Abohashem, S., Pitman, R. K., Tawakol, A., & Osborne, M. T. (2019). Psychosocial Stress and Cardiovascular Disease. *Current Treatment Options in Cardiovascular Medicine, 21*(5), 23. doi:10.1007/s11936-019-0724-5

de Vibe, M., Solhaug, I., Tyssen, R., Friborg, O., Rosenvinge, J. H., Sørlie, T., & Bjørndal, A. (2013). Mindfulness training for stress management: A randomised controlled study of medical and psychology students. *BMC Medical Education, 13*(1), 107. doi:10.1186/1472-6920-13-107

Dennis, E. A., Dengo, A. L., Comber, D. L., Flack, K. D., Savla, J., Davy, K. P., & Davy, B. M. (2010). Water consumption increases weight loss during a hypocaloric diet intervention in middle-aged and older adults. *Obesity (Silver Spring), 18*(2), 300-307. doi:10.1038/oby.2009.235

Dorji, T.C., & Dorji, R. (2005). *Living the Bhutanese way.* DSB publications, Thimphu: Bhutan.

El Bcheraoui, C., Memish, Z. A., Tuffaha, M., Daoud, F., Robinson, M., Jaber, S., Al Rabeeah, A. A. (2014). Hypertension and its associated risk factors in the kingdom of Saudi Arabia, 2013: A national survey. *International Journal of Hypertensions, 2014*, 564-679. doi:10.1155/2014/564679

Erkoc, S. B., Isikli, B., Metintas, S., & Kalyoncu, C. (2012). Hypertension Knowledge-Level Scale (HK-LS): A study on development, validity and reliability. *International Journal of Environment Research and Public Health, 9*(3), 1018-1029. doi:10.3390/ijerph9031018

Europe, P. (2018). The impact of pulmonary arterial hypertension (PAH) on the lives of patients and carers: Results from an international survey 2012. *European Respiratory Review, 22*(130), 535-542.

Feyh, A., Bracero, L., Lakhani, H. V., Santhanam, P., Shapiro, J. I., Khitan, Z., & Sodhi, K. (2016). Role of dietary components in modulating hypertension. *Journal of Clinical & Experimental Cardiology*, *7*(4), 433. doi:10.4172/2155-9880.1000433

Fidell, L. S., & Tabachnick, B. G. (2009). *Using multivariate statistics* (5th ed.). California: Pearson.

Forouzanfar, M. H., Liu, P., Roth, G. A., Ng, M., Biryukov, S., Marczak, L., Murray, C. J. L. (2017). Global burden of hypertension and systolic blood pressure of at least 110 to 115 mm Hg, 1990-2015. *The Journal of the American Medical Association*, *317*(2), 165-182. doi:10.1001/jama.2016.19043

Gaesser, G. A., Angadi, S. S., Sawyer, B. J., Tucker, W. J., & Jarrett, C. (2015). Exercise and diet improve cardiometabolic risk in overweight and obese individuals without weight loss. In *Glucose Intake and Utilization in Pre-Diabetes and Diabetes* (pp. 355-367). California: Elsevier.

Gebremichael, G. B., Berhe, K. K., & Zemichael, T. M. (2019). Uncontrolled hypertension and associated factors among adult hypertensive patients in Ayder comprehensive specialized hospital, Tigray, Ethiopia, 2018. *BMC Cardiovasc Disord, 19*(1), 121. doi:10.1186/s12872-019-1091-6

Giena, V. P., Thongpat, S., & Nitirat, P. (2018). Predictors of health-promoting behaviour among older adults with hypertension in Indonesia. *International Journal of Nursing Sciences, 5*(2), 201-205. doi:https://doi.org/10.1016/j.ijnss.2018.04.002

Gray, J. R., Grove, S. K., & Sutherland, S. (2019). *The practice of nursing research: Appraisal, synthesis and generation of evidence* (8th ed.). Riverport Lane, St. Louise: Elsevier.

Grossman, S., & Porth, C. (2014). *Study guide for Porth's pathophysiology: Concepts of altered health states.* Philadelphia: Lippincott Williams & Wilkins.

Han, H.-R., Lee, H., Commodore-Mensah, Y., & Kim, M. (2014). Development and validation of the hypertension self-care profile: a practical tool to measure hypertension self-care. *The Journal of Cardiovascular Nursing, 29*(3), E11.

Hardan-Khalil, K., & Mayo, A. M. (2015). Psychometric properties of the multidimensional scale of perceived social support. *Clinical Nurse Specialist, 29*(5), 258-261. doi:10.1097/NUR.0000000000000148

Hasandokht, T., Farajzadegan, Z., Siadat, Z. D., Paknahad, Z., & Rajati, F. (2015). Lifestyle interventions for hypertension treatment among Iranian women in primary health-care settings: Results of a randomized controlled trial. *Journal of Research in Medical Sciences: The Official Journal of Isfahan University of Medical Sciences, 20*(1), 54.

He, F. J., Campbell, N. R., & MacGregor, G. A. (2012). Reducing salt intake to prevent hypertension and cardiovascular disease. *Revista Panamericana de Salud Pública, 32*, 293-300.

Hendriksen, M. A., van Raaij, J. M., Geleijnse, J. M., Breda, J., & Boshuizen, H. C. (2015). Health gain by salt reduction in Europe: A modelling study. *Public Library of Science, 10*(3), e0118873. doi:10.1371/journal.pone.0118873

Holman, D., Johnson, S., & O'Connor, E. (2018). Stress management interventions: Improving subjective psychological well-being in the workplace. *Handbook of well-being. Salt Lake City, UT: DEF Publishers. doi: nobascholar. com*.

Horne, R., Weinman, J., & Hankins, M. (1999). The beliefs about medicines questionnaire: The development and evaluation of a new method for assessing the cognitive representation of medication. *Psychology & Health, 14*(1), 1-24. doi:10.1080/08870449908407311

Husain, K., Ansari, R. A., & Ferder, L. (2014). Alcohol-induced hypertension: Mechanism and prevention. *World Journal of Cardiology, 6*(5), 245.

Innes, K., Selfe, T., Brown, C., Rose, K., & Thompson-Heisterman, A. (2012). The effects of meditation on perceived stress and related indices of psychological status and sympathetic activation in persons with Alzheimer's disease and their caregivers: a pilot study. *Evidence-Based Complementary and Alternative Medicine, 2012*.

James, P. A., Oparil, S., Carter, B. L., Cushman, W. C., Dennison-Himmelfarb, C., Handler, J., Ortiz, E. (2014). 2014 evidence-based guideline for the management of high blood pressure in adults: report from the panel members appointed to the eighth joint national committee (jnc 8) 2014 guideline for management of high blood pressure2014 guideline for management of high blood pressure. *The Journal of the American Medical Association, 311*(5), 507-520. doi:10.1001/jama.2013.284427

Jandeekaewsakul, P., Watthayu, N., & Suwonnaroop, N. (2018). Factors predicting self-management behaviors of uncontrollable hypertension patients. *Nursing Science Journal of Thailand, 36*(1), 31-43.

Jankowska-Polańska, B., Uchmanowicz, I., Dudek, K., & Mazur, G. (2016). Relationship between patients' knowledge and medication adherence among patients with hypertension. *Patient Preference and Adherence, 10*, 2437.

Kasper, D., Fauci, A., Hauser, S., Longo, D., Jameson, J., & Loscalzo, J. (2018). *Harrison's principles of internal medicine*: McGraw-Hill Professional Publishing.

Katsanos, A. H., Filippatou, A., Manios, E., Deftereos, S., Parissis, J., Frogoudaki, A., & Voumvourakis, K. (2017). Blood pressure reduction and secondary stroke prevention: A systematic review and metaregression analysis of randomized clinical trials. *Hypertension, 69*(1), 171-179.

Katzung, B. G. (2017). *Basic and clinical pharmacology* (14th ed.). Trevor AJ: McGraw Hill Professional.

Kawamura, A., Kajiya, K., Kishi, H., Inagaki, J., Mitarai, M., Oda, H., Kobayashi, S. (2016). Effects of the DASH-JUMP dietary intervention in Japanese participants with high-normal blood pressure and stage 1 hypertension: An open-label single-arm trial. *Hypertension Research, 39*(11), 777-785. doi:10.1038/hr.2016.76

Kim, Y., & Kong, K. A. (2015). Do hypertensive individuals who are aware of their disease follow lifestyle recommendations better than those who are not aware? *PLoS One, 10*(8), e0136858. doi:10.1371/journal.pone.0136858

Kirkland, E. B., Heincelman, M., Bishu, K. G., Schumann, S. O., Schreiner, A., Axon, R. N., & Moran, W. P. (2018). Trends in healthcare expenditures among us adults with hypertension: National estimates, 2003-2014. *Journal of the American Heart Association, 7*(11). doi:10.1161/JAHA.118.008731

Kokkinos, A., le Roux, C. W., Alexiadou, K., Tentolouris, N., Vincent, R. P., Kyriaki, D., & Katsilambros, N. (2010). Eating slowly increases the postprandial response of the anorexigenic gut hormones, peptide YY and glucagon-like peptide-1. *Journal of Clinical Endocrinology and Metabolism, 95*(1), 333-337. doi:10.1210/jc.2009-1018

Kumar, N. H. (2015). *Factors related to health promoting behaviors amonghypertensive patients in Bhutan*. Retrieved from http://digital_collect.lib.buu.ac.th/dcms/files/56910102.pdf

Labata, B. G., Ahmed, M. B., Mekonen, G. F., & Daba, F. B. (2019). Prevalence and predictors of self care practices among hypertensive patients at Jimma University Specialized Hospital, Southwest Ethiopia: Cross-sectional study. *BMC Research Notes, 12*(1), 86.

Lally, P., Van Jaarsveld, C. H., Potts, H. W., & Wardle, J. (2010). How are habits formed: Modelling habit formation in the real world. *European Journal of Social Psychology*, *40*(6), 998-1009.

Leaming, L. (2004). *One big happy family? Gross national happiness and the concept of family in Bhutan.* Retrieved from http://www.bhutanstudies.org.bt/?s=One+big+happy+family

Lemay, J., Waheedi, M., Al-Sharqawi, S., & Bayoud, T. (2018). Medication adherence in chronic illness: Do beliefs about medications play a role? *Patient Preference and Adherence*, *12*, 1687.

Linton, A. D. (2016). *Introduction to medical-surgical nursing.* (6th ed.). St. Louis: Elsevier.

Lochner, J. E., Rugge, J. B., & Judkins, D. Z. (2006). How effective are lifestyle changes for controlling hypertension?. *Clinical Inquiries, 2006 (MU)*.

Markus, H. (2016). Stroke: causes and clinical features. *Medicine*, *44*(9), 515-520.

McCance, K. L., & Huether, S. E. (2014). *Pathophysiology: The biologic basis for disease in adults and children*. Maryland Hieghts, Mo: Elsevier Health Sciences.

McKay, A., & Wangchuk, D. (2005). Traditional medicine in Bhutan. *Asian Medicine*, *1*(1), 204-218.

Ministry of Health. (2015). *National survey for non-communicable disease risk factors and mental health using WHO STEPS approach in Bhutan – 2014.* Retrieved from: www.who.int/ncds/surveillance/steps/Bhutan_2014_STEPS_Report.pdf

Ministry of Health.(2018). *Annual health bulletin 2018*. Royal Government of Bhutan, Thimphu: United Printing Press.

Ministry of Health.(2019). *Annual health bulletin 2019*. Royal Government of Bhutan, Thimphu: Tshangpa Printing Press.

Mostafavi, F., Najimi, A., Sharifirad, G., & Golshiri, P. (2016). Beliefs about medicines in patients with hypertension: The instrument validity and reliability in Iran. *Materia Socio-medica*, *28*(4), 298.

Motlagh, S. F. Z., Chaman, R., Sadeghi, E., & Eslami, A. A. (2016). Self-care behaviors and related factors in hypertensive patients. *Iranian Red Crescent Medical Journal*, *18*(6).

Narasimhan, K., Neha, V. C., & Vijayarekha, K. (2012). Hypertensive retinopathy diagnosis from fundus images by estimation of avr. *Procedia Engineering*, *38*, 980-993. doi:https://doi.org/10.1016/j.proeng.2012.06.124

Nguyen, B., Bauman, A., & Ding, D. (2019). Association between lifestyle risk factors and incident hypertension among middle-aged and older Australians. *Preventive Medicine*, *118*, 73-80. doi:https://doi.org/10.1016/j.ypmed.2018.10.007

National Health Survey [NHS]. (2012). Thimphu, Bhutan: Ministry of Health.

Nie, B., Chapman, S. C., Chen, Z., Wang, X., & Wei, L. (2019). Utilization of the beliefs about medicine questionnaire and prediction of medication adherence in China: A systematic review and meta-analysis. *Journal of Psychosomatic Research*.

Niriayo, Y. L., Mamo, A., Gidey, K., & Demoz, G. T. (2019). Medication Belief and Adherence among Patients with Epilepsy. *Behavioural Neurology*, *2019*.

Niriayo, Y. L., Ibrahim, S., Kassa, T. D., Asgedom, S. W., Atey, T. M., Gidey, K., & Kahsay, D. (2019). Practice and predictors of self-care behaviors among ambulatory patients with hypertension in Ethiopia. *PloS one*, *14*(6), e0218947.

Ogihara, T., Kikuchi, K., Matsuoka, H., Fujita, T., Higaki, J., Horiuchi, M., & Kario, K. (2009). The Japanese society of hypertension guidelines for the management of hypertension (JSH 2009). *Hypertension Research*, *32*(1), 3-107.

Okwuonu, C. G., Emmanuel, C. I., & Ojimadu, N. E. (2014). Perception and practice of lifestyle modification in the management of hypertension among hypertensives in south-east Nigeria. *International Journal of Medicine and Biomedical Research*, *3*(2), 121-131.

Pender, N. J., Murdaugh, C. L., & Parsons, M. N. (2015). *Health promotion in nursing practice* (7th ed.). US: Julie Levin Alexander.

Pelzom, D., Isaakidis, P., Oo, M. M., Gurung, M. S., & Yangchen, P. (2017). Alarming prevalence and clustering of modifiable noncommunicable disease risk factors among adults in Bhutan: A nationwide cross-sectional community survey. *BMC Public Health*, *17*(1), 975.

Plichta, S. B., & Kelvin, E. A. (2013). *Munro's statistical methods for healthcare research* (6th ed.). Philadelphia: Wolter Kluwer Health.

Pulmonary Arterial Hypertension Association. (2013). The impact of pulmonary arterial hypertension (PAH) on the lives of patients and caregivers: Results from a US study.

Reblin, M., & Uchino, B. N. (2008). Social and emotional support and its implication for health. *Current Opinion in Psychiatry*, *21*(2), 201.

Rinpoche, P. (1998). *The words of my perfect teacher: A complete translation of a classic introduction to Tibetan Buddhism*. Rowman Altamira.

Ryan, P., & Sawin, K. J. (2009). The individual and family self-management theory: Background and perspectives on context, process, and outcomes. *Nursing Outlook*, *57*(4), 217-225. e216.

Samadian, F., Dalili, N., & Jamalian, A. (2016). Lifestyle modifications to prevent and control hypertension. *Iran Journal of Kidney Disease*, *10*(5), 237-263.

Santana, N. M. T., Mill, J. G., Velasquez-Melendez, G., Moreira, A. D., Barreto, S. M., Viana, M. C., & Molina, M. D. C. B. (2018). Consumption of alcohol and blood pressure: Results of the ELSA-Brasil study. *Public Library of Science*, *13*(1), 1-13. doi:10.1371/journal.pone.0190239

Sheilini, M., Hande, H., Prabhu, M., Pai, M. S., Devi, E. S., Kamath, A., & George, A. (2018). Antihypertensive Prescription Pattern, Self-reported Reasons for Non adherence to Antihypertensives and Lifestyle Practices among the Elderly. *Journal of Clinical and Diagnostic Research*, *12*(1).

Sherab, K. & Lhudup, K. (2008). Superstition. In F. Rennie & R. Mason (eds.). Bhutan: Ways of knowing.

Shohani, M., Badfar, G., Nasirkandy, M. P., Kaikhavani, S., Rahmati, S., Modmeli, Y., & Azami, M. (2018). The effect of yoga on stress, anxiety, and depression in women. *International Journal of Preventive Medicine, 9*.

Shrestha, P., Wattanakitkrileart, D., & Pongthavornkamol, K. (2019). Factors Influencing Medication Adherence in Nepalese Patients with Essential Hypertension. *Nursing Science Journal of Thailand, 37*(3), 18-31.

Singh, A. K., Loscalzo, J., & Hammond, S. (2019). *The Brigham intensive review of internal medicine.* Elsevier Health Sciences.

Singh, S., Shankar, R., & Singh, G. P. (2017). Prevalence and associated risk factors of hypertension: A cross-sectional study in urban Varanasi. *International Journal of Hypertension, 2017*.

Spruill, T. M., Butler, M. J., Thomas, S. J., Tajeu, G. S., Kalinowski, J., Castaneda, S. F., Shimbo, D. (2019). Association between high perceived stress over time and incident hypertension in black adults: Findings from the Jackson heart study. *Journal of American Heart Association, 8*(21), e012139. doi:10.1161/JAHA.119.012139

Thinley & Colleagues. (2017). *The Kingdom of Bhutan health system review: Health system in transition.* Mahatma Gandhi Marg, New Delhi: SEARO Library.

Tibebu, A., Mengistu, D., & Negesa, L. (2017). Adherence to recommended lifestyle modifications and factors associated for hypertensive patients attending chronic follow-up units of selected public hospitals in Addis Ababa, Ethiopia. *Patient Preference and Adherence, 11,* 323-330. doi:10.2147/PPA.S126382

Tshomo, D. (2019, May 15). Stroke, leading cause of death in 2018. *Kuensel.*

Tripathy, J. P., Thakur, J. S., Jeet, G., Chawla, S., & Jain, S. (2017). Alarmingly high prevalence of hypertension and pre-hypertension in North India-results from a large cross-sectional STEPS survey. *PLoS One, 12*(12), e0188619. doi:10.1371/journal.pone.0188619

Tripathi, M. N., Kumari, S., & Ganpat, T. S. (2018). Psychophysiological effects of yoga on stress in college students. *Journal of Education and Health Promotion, 7*.

Tziomalos, K. (2019). Secondary hypertension: Novel concepts. *Current Hypertension Reviews*.

Verma, S., Sahni, S., Vijayan, V. K., & Talwar, A. (2016). Depression in pulmonary arterial hypertension: An undertreated comorbidity. *Lung India : Official Organ of Indian Chest Society*, *33*(1), 58–63. doi:10.4103/0970-2113.173072

Wangdi, K., & Jamtsho, T. (2019). Prevalence and correlates of current alcohol use among Bhutanese adults: A nationally representative data analysis. *Indian Journal of Psychological Medicine. 41*(1), 38-45.doi: 10.4103/IJPSYM.JPSYM_412_18

Wangdi, T. (2013). Burden, determinants and control of hypertension: A Bhutanese perspective. *Regional Health Forum, 17*(1), 20-25.

Warren-Findlow, J., Krinner, L. M., Vinoski Thomas, E., Coffman, M. J., Gordon, B., & Howden, R. (2019). Relative and cumulative effects of hypertension self-care behaviors on blood pressure. *Western Journal of Nursing Research, 42*(3), 157-164.

Warren-Findlow, J., Seymour, R. B., & Brunner Huber, L. R. (2012). The association between self-efficacy and hypertension self-care activities among African American adults. *Journal of Community Health, 37*(1), 15-24. doi:10.1007/s10900-011-9410-6

Weaver, C.G., Clement, F. M., Campbell, N. R., James, M. T., Klarenbach, S. W., Hemmelgarn, B. R., McBrien, K. A. (2015). Healthcare costs attributable to hypertension: Canadian population-based cohort study. *Hypertension, 66*(3), 502-508.

Weigle, D. S., Breen, P. A., Matthys, C. C., Callahan, H. S., Meeuws, K. E., Burden, V. R., & Purnell, J. Q. (2005). A high-protein diet induces sustained reductions in appetite, ad libitum caloric intake, and body weight despite compensatory changes in diurnal plasma leptin and ghrelin concentrations. *American Journal of Clinical Nutrition, 82*(1), 41-48. doi:10.1093/ajcn.82.1.41

Whelton, P. K., Carey, R. M., Aronow, W. S., Casey, D. E., Jr., Collins, K. J., Dennison Himmelfarb, C., & Wright, J. T. (2018). 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the prevention, detection, evaluation, and management of high blood pressure in adults: A report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *Journal of the American College of Cardiology, 71*(19), e127-e248. doi:10.1016/j.jacc.2017.11.006

Wilson, P. W. (2018). *Overview of established risk factors for cardiovascular disease.* Retrieved from https://www.uptodate.com/contents/overview-of-established-risk-factors-for-cardiovascular-disease?topicRef=3850&source=see_link

World Health Organization. (2020). *Healthy diet*. Retrieved from www.who.int/en/news-room/fact-sheets/detail/healthy-diet

World Health Organization. (2019a). *Hypertension: Key facts.* Retrieved from www.who.int/news-room/fact-sheets/detail/hypertension

World Health Organization. (2019b). *Tobacco. Key facts.* Retrieved from https://www.who.int/news-room/fact-sheets/detail/tobacco

World Health Organization. (2019c). *Global strategy on diet, physical activity and health*. Retrieved from https://www.who.int/dietphysicalactivity/factsheet_adults/en/

World Health Organization. (2019d). *Track 2: Health literacy and health behavior.* Retrieved from https://www.who.int/healthpromotion/conferences/7gchp/track2/en/

World Health Organization. (2018a). *The top 10 causes of death.* Retrieved from: www.who.int/en/news-room/fact-sheets/detail/the-top-10-causes-of-death.

World Health Organization. (2018b). *Non-communicable disease country profile 2018.* Retrieved from https://www.who.int/nmh/countries/en/

World Health Organization. (2018c). *Harmful use of alcohol kills more than 3 million people each year, most of them are men*. Retrieved from https://www.who.int/news/item/21-09-2018-harmful-use-of-alcohol-kills-more-than-3-million-people-each-year--most-of-them-men

World Health Organization. (2016). *Global NCD target: Reduce high blood pressure*. Retrieved from w.who.int/publications-detail/global-ncd-target-reduce-high-blood-pressure

World Health Organization. (2013). *A global brief on hypertension: Silent killer, global public health crisis: World Health Day 2013*. Retrieved from https://apps.who.int/iris/bitstream/handle/10665/79059/WHO_DCO_WHD_2013.2_ara.pdf

Wilcken, D. E. (2015). Physiology of the normal heart. *Surgery (Oxford), 33*(2), 43-46.

Xiao, M., Zhang, F., Xiao, N., Bu, X., Tang, X., & Long, Q. (2019). Health-related quality of life of hypertension patients: A population-based cross-sectional study in Chongqing, China. *International Journal Of Environmental Research and Public Health, 16*(13), 2348. doi:10.3390/ijerph16132348

Yang, M. H., Kang, S. Y., Lee, J. A., Kim, Y. S., Sung, E. J., Lee, K. Y., Lee, S. Y. (2017). The effect of lifestyle changes on blood pressure control among hypertensive patients. *Korean Journal of Family Medicine, 38*(4), 173-180. doi:10.4082/kjfm.2017.38.4.173

Zimet, G. D., Dahlem, N. W., Zimet, S. G., & Farley, G. K. (1988). The multidimensional scale of perceived social support. *Journal of Personality Assessment, 52*(1), 30-41. doi:10.1207/s15327752jpa5201_2

Zimet, G. D. (1998). The multidimensional scale of perceived social support (MSPSS). C.P. Zalaquettn & R. J. Wood. (Eds). (1998). *Evaluating stress: A Book of Resource*. Lanham, MD: The Scarecrow press.

APPENDICES

APPENDIX A

Responses to questions on the Hypertension Self-care Profile (HBP-SCP) Behavior Scale (Number and percent of the participants).

Responses to questions on the Hypertension Self-care Profile (HBP-SCP) Behavior Scale (Number and percent of the samples).

S/No	Questions	*1* *(Never)*	*2* *(Rarely)*	3 (Sometimes)	4 (Always)
1	Take part in regular physical activity (e.g., 30 minutes of walking 4–5 days per week)?	19 (17.6%)	19 (17.6%)	48 (44.4%)	22 (20.4%)
2	Read nutrition facts label to check information on sodium content?	49 (45.4%)	20 (18.6%)	30 (27.7%)	9 (8.3%)
3	Replace traditional high-salt foods (e.g., canned soups, Oodles of Noodles) with low-salt products (e.g., homemade soups, fresh vegetables)?	13 (12.0%)	38 (35.2%)	38 (35.2%)	19 (17.6%)
4	Limit use of high-salt condiments (e.g., ketchup)?	9 (8.4%)	28 (25.9%)	38 (35.2%)	33 (30.5%)
5	Eat less than 1 teaspoon of table salt per day (6 grams)?	14 (13.0%)	21 (19.4%)	38 (35.2%)	35 (32.4%)
6	Eat less foods that are high in saturated (e.g., red meat, butter) and trans fat (e.g., lard, shortening)?	8 (7.4%)	19 (17.6%)	46 (42.6%)	35 (32.4%)
7	Use broil, bake or steam instead of frying when cooking?	4 (3.7%)	21 (19.4%)	50 (46.3%)	33 (30.6%)
8	Read nutrition label to check information on saturated (e.g., butter, red meats) and trans fat (e.g. Lard, shortening)?	43 (39.8%)	25 (23.2%)	29 (26.9%)	11 (10.1%)
9	Replace traditional high-fat foods (e.g., deep fried chicken) with low-fat products (e.g., baked chicken)?	11 (10.2%)	29 (26.8%)	50 (46.3%)	18 (16.7%)
10	Consume less caffeine intake (eg coffee, tea, cola beverages) < 5 cups coffee/day?	12 (11.1%)	35 (32.4%)	35 (32.4%)	26 (24.1%)

S/No	Questions	*1 (Never)*	*2 (Rarely)*	3 (Sometimes)	4 (Always)
11	Eat 5 or more servings of fruits and vegetables daily?	4 (3.7%)	31 (28.7%)	64 (59.3%)	9 (8.3%)
12	Practice none or moderation in drinking alcohol daily (2 glasses or less for men; 1 glass or less for women)?	26 (24.1%)	10 (9.3%)	17 (15.7%)	55 (50.9%)
13	Practice non-smoking?	20 (18.5%)	5 (4.6%)	5 (4.6%)	78 (72.2%)
14	Check your blood pressure at home?	64 (59.3%)	15 (13.9%)	16 (14.8%)	13 (12.0%)
15	Forget to take your blood pressure medicine?	41 (38.0%)	17 (15.7%)	39 (36.1%)	11 (10.2%)
16	Forget to fill your prescription?	31 (28.7%)	37 (34.2%)	33 (30.6%)	7 (6.5%)
17	Keep your weight down?	12 (11.1%)	43 (39.8%)	35 (32.4%)	18 (16.7%)
18	Monitor situations that cause a high level of stress (e.g., arguments, death in the family) resulting in blood pressure elevation?	13 (12.0%)	31 (28.7%)	45 (41.7%)	19 (17.6%)
19	Engage in activities that can lower stress (e.g., deep breathing, meditation)?	11 (10.2%)	27 (25.0%)	57 (52.8%)	13 (12.0%)
20	See a doctor regularly?	4 (3.7%)	16 (14.8%)	52 (48.2)	36 (33.3%)

APPENDIX B

Questionnaires in English

Date: …….....

Code number…….

DEMOGRAPHIC QUESTIONNAIRE

Part Ⅰ: Direction: Please read each question carefully and kindly give your honest response to all the questions. There is no right or wrong answer.

1. Age…….years

2. Gender

☐ Male ☐ Female

3. Educational level

☐ Primary ☐ Secondary School ☐ High School

☐ Undergraduate ☐ Graduate

4. Marital status

☐ Married ☐ Unmarried ☐ Divorced/separated/widowed

5. Employment status

☐ Employed ☐ Unemployed ☐ Retired

☐ Student

6.....to.....18

19. Name of blood pressure lowering medication(s)……

20. Number of blood pressure lowering medications……

Hypertension self-care profile behavior scale (HBP SCP-Behavior scale)

Direction: Listed below are common recommendations for persons with hypertension. Please indicate how often you follow the recommendations by marking on the scale of 1 to 4.

1. Never (Do not practice it)
2. Rarely (Seldomly practice it)
3. Sometimes (Occasionally practice it)
4. Always (All the time)

S/No	How often do you do the following?	Never	Rarely	Sometimes	Always
		1	2	3	4
1	Take part in regular physical activity (e.g., 30 minutes of walking 4-5 days per week)?				
2	Read nutrition facts label to check information on sodium content?				
3	……				
4	……				
5	……				
6	……				
7.....to.....18					
19	Engage in activities that can lower stress (e.g., deep breathing, meditation)?				
20	See a doctor regularly?				

Hypertension Self-Efficacy Scale

Directions: The following questionnaire asks your confidence in carrying out the task related to management of high blood pressure. Read each statement carefully and rate your level of confidence on a scale of 1 to 10 with 1 not at all confident to 10 totally confident.

	1. How confident are you that you can do all the things necessary to manage your high blood pressure on a regular basis?										
Not at all	1	2	3	4	5	6	7	8	9	10	Totally
	2. ……..... ……..										
Not at all	1	2	3	4	5	6	7	8	9	10	Totally
	3. ……. ……										
Not at all	1	2	3	4	5	6	7	8	9	10	Totally
	4. ……..……. ……...										
Not at all	1	2	3	4	5	6	7	8	9	10	Totally
	5. How confident are you that you can do things other than just taking medication to reduce your high blood pressure in your everyday life?										
Not at all	1	2	3	4	5	6	7	8	9	10	Totally

Belief About Medicines Questionnaire (BMQ)

Directions: This questionnaire ask about your perception on medication used to manage hypertension. Please indicate how strongly you agree or disagree against each statement.

Circle “1” if you strongly disagree

Circle ‘2’ if you disagree

Circle ‘3’ if you have ‘no comments’

Circle ‘4’ if you agree

Circle ‘5’ if you strongly agree.

S/No	Statement	Strongly disagree	Disagree	No comments	Agree	Strongly agree
		1	2	3	4	5
	General overuse					
1.	Doctor use too many medicines					
2……to……..3						
4	If doctors had more time with patients, they would prescribe fewer medicines					
5	General harm					
1.	People who take medicines should stop their treatment for a while every now and again					
2……to……3						
4.	All medicines are poison					

Belief about medicine questionnaire (continued)

S/No	Statement	Strongly disagree	Disagree	No comments	Agree	Strongly agree
		1	2	3	4	5
	Specific necessity					
1.	My health, at present, depends on my medicines					
2……to……..4						
5	My medicines protect me from becoming worse					
5	**Specific concern**					
1.	Having to take these medicines worries me					
2……to……4						
5.	I sometimes worry about becoming too dependent on my medicines					

MULTI-DIMINENSIONAL SCALE OF PERCEIVED SOCIAL SUPPORT (MSPSS)

Directions: We are interested in how you feel about the following statements. Read each statement carefully. Indicate how you feel about each statement.

Circle the "1" if you Very Strongly Disagree

Circle the "2" if you Strongly Disagree

Circle the "3" if you Mildly Disagree

Circle the "4" if you are Neutral

Circle the "5" if you Mildly Agree

Circle the "6" if you Strongly Agree

Circle the "7" if you Very Strongly Agree

S/No	Statement	Very strongly disagree	Strongly disagree	Mildly disagree	Neutral	Mildly agree	Strongly agree	Very strongly agree
		1	2	3	4	5	6	7
1	There is a special person who is around when I am in need.							
2	……							
3	……							
4	……							
5……to……10								
11	My family is willing to help me make decisions.							
12	I can talk about my problems with my friends.							

Hypertension Knowledge Level Scale (Hk-Ls)

Directions: This questionnaire assesses your basic knowledge on various aspects of hypertension including definition, medical treatment, drug compliance, lifestyle, diet and complication. The questionnaire consists of mixture of correct as well as incorrect statement. Please response to each statement by marking [✓] in the appropriate column based on your knowledge and experience.

S/No	Statement	Correct	Incorrect	Don't know
1	Increased diastolic blood pressure also indicates increased blood pressure.			
2	High diastolic or systolic blood pressure indicates increased blood pressure			
3	.....			
4	.....			
5……to……20				
21	Increased blood pressure can cause kidney failure, if left untreated.			
22	Increased blood pressure can cause visual disturbances, if left untreated.			

APPENDIX C

Permission letters to use instruments

1. Hypertension self-care profile behavior scale (HBP-SCP-Behavior Scale).

RE: Seeking permission to use 'Hypertension self-care profile behavior scale'.
From: Hae Ra Han <hhan3@jhu.edu>
To: 'NiMa Dorji' dorji_405@yahoo.com
Date: Dec 3 at 3:19 AM
Yes, this email serves as my permission for you to use HBP-SCP for your masters thesis. Best wishes, Haera

From: NiMa Dorji <dorji_405@yahoo.com>
Sent: Thursday, November 28, 2019 11:48 AM
To: Hae Ra Han <hhan3@jhu.edu>
Subject: Seeking permission to use 'Hypertension self-care profile behavior scale'.

Dear Dr. Hae-Ra Han

I am Nima Dorji, a master degree nursing student studying at Faculty of Nursing, Burapha University, Thailand. As a partial requirement of master degree, I am conducting research entitled " Factors influencing lifestyle modification among hypertensive patients in Bhutan" under the supervision of my major advisor Assistant Professor Dr. Niphawan Samartkit.

The purpose of the study is to investigate lifestyle modification practice and its associated factors among aforesaid research participants. Therefore, I would like to seek your kind permission to use the instrument “Hypertension self-care profile behavior scale (HBP SCP-Behavior scale)”.

I look forward for your kind endorsement please.
Thanking you
Yours faithfully
Nima Dorji

2. Hypertension Self-Efficacy Scale

Jan Warren-Findlow <jwarren1@uncc.edu>
To: NiMa Dorji dorji_405@yahoo.com
Hi Nima,
The Hypertension Self-Efficacy scale is attached. Scoring instructions are at the bottom.

With regard to an overall adherence score for the H-SCALE. There really isn't one. What we have been investigating is the H-SCALE index (see the attached article). You can determine adherence to each subscale (yes/no) and then sum the 6 subscales. This will give you a score from 0 to 6. Six would indicate adherence to all of the subscales. Please note this is in the very preliminary stages and we haven't done a great deal of validation with it.

Sincerely, Jan
“Advance health equity and well-being in an urbanizing world"
publichealth.uncc.edu
Jan Warren-Findlow, PhD| Associate Professor
Pronouns: she/her/herself
MPH Program Director
UNC Charlotte | Dept. of Public Health Sciences
9201 University City Blvd. | Charlotte, NC 28223
Office: CHHS 427B
voice: 704/687-7908 | fax: 704/687-1644
jwarren1@uncc.edu | https://go.uncc.edu/mph.uncc.edu

On Fri, Nov 22, 2019 at 5:40 AM NiMa Dorji <dorji_405@yahoo.com> wrote:

Dear Dr. Warren-Findlow

As introduced earlier while seeking your kind permission to use HSCALE; I am Nima Dorji, a master degree nursing student studying at Faculty of Nursing, Burapha University, Thailand. As a partial requirement of master degree, I am conducting a research entitled " Factors influencing lifestyle modification among hypertensive patients in Bhutan" under the supervision of my major advisor Assistant Professor Dr. Niphawan Samartkit.

One of the predicting variables for lifestyle modification is self-efficacy. In this regard I would like to request your kind permission to use your scale 'Hypertension self-efficacy scale' containing 5 items.

Further, I would be immensely grateful if you could kindly clarify on how to calculate 'overall adherence to self-care behavior' on HSCALE.

I look forward for your unwavering professional guidance and generous endorsement please.

Thanking you
Yours faithfully
Nima Dorji
Faculty of Nursing
Burapha University
Thailand

3. Belief about medicine questionnaire (BMQ).

Subject: Re: Seeking permission to use belief about medicine questionnaire
From: Hlíf Vilhelmsdóttir hlif84@gmail.com
To: NiMa Dorji dorji_405@yahoo.com
Date: Dec 21 at 8:18 PM

Yes, of course you can.
Best regards,
Hlíf Vilhelmsdótti

On Sat, 21 Dec 2019 at 06:50, NiMa Dorji <dorji_405@yahoo.com> wrote:
Respected Hlif Vilhelmsdottir

I am Nima Dorji, a master degree nursing student studying at Faculty of Nursing, Burapha University, Thailand. As a partial requirement of master degree, I am conducting a research entitled " Factors influencing lifestyle modification among hypertensive patients in Bhutan" under the supervision of my major adviser Assistant Professor Dr. Niphawan Samartkit.

In this study, one of the independent variables of interest is belief about anti-hypertensive medication. Therefore, I would like to seek your kind permission to use the instrument “Belief about medicine questionnaire (BMQ)" from your research article 'Icelander’s belief about medicines. Use of BMQ' published on 'The Icelandic Medical Journal'.

I look forward for your kind endorsement please.

Thanking you
Yours faithfully
Nima Dorji (Student)
Faculty of Nursing
Burapha University

4. Multidimensional Scale of Perceived Social Support.

From: Zimet, Gregory D gzimet@iu.edu
Nov 9, 2019 at 11:08 AM

To: NiMa Dorji <dorji_405@yahoo.com

Dear Nima Dorji,

You have my permission to use the Multidimensional Scale of Perceived Social Support (MSPSS) in your research. I have attached the original English language version of the scale (with scoring information on the 2nd page), a document listing several of the articles that have reported on the reliability and validity of the MSPSS, and a chapter that I wrote about the scale.

I hope your research goes well.

Best regards,
Greg Zimet

Gregory D. Zimet, PhD, FSAHM | Professor of Pediatrics & Clinical Psychology
Co-Director, IUPUI Center for HPV Research
Division of Adolescent Medicine, Department of Pediatrics
Indiana University School of Medicine
410 W. 10th Street, HS 1001, Indianapolis, IN 46202, USA
T +1 317-274-8812 | Fax +1 317-274-0133
Email gzimet@iu.edu

From: NiMa Dorji <dorji_405@yahoo.com>

Sent: Friday, November 8, 2019 10:48 PM

To: Zimet, Gregory D

Subject: [External] Seeking permission to use Multidimensional Scale of Perceived Social Support

Dear Dr. Zimet

I am Nima Dorji, a master degree nursing student studying at Faculty of Nursing, Burapha University, Thailand. As a partial requirement of master degree, I am conducting a research entitled " Factors influencing lifestyle modification among hypertensive patients in Bhutan" under the supervision of my major advisor Assistant Professor Dr. Niphawan Samartkit.

In this study, one of the independent variables of interest is social support. I am interested to explore the association between social support and lifestyle modification among the aforesaid research participants. Therefore, I would like to seek your kind permission to use the instrument “Multidimensional Scale of Perceived Social Support”.

I look forward for your kind endorsement please.

Thanking you

Yours faithfully

Nima Dorji

Faculty of Nursing

Burapha University

Thailand

5. Hypertension Knowledge-Level Scale (HK-LS)

APPENDIX D

Participants information sheet and consent forms

PARTICIPANT'S INFORMATION SHEET

Dear participants

I am Nima Dorji, a master degree student studying at Faculty of Nursing, Burapha University, Thailand. I am conducting research on "Factors influencing to lifestyle modification among hypertensive patients in Bhutan". The objectives of the study are to describe lifestyle modification and to examine whether hypertension knowledge, perceived self-efficacy, belief about medicine and perceived social support predict lifestyle modification among hypertensive patients in Bhutan. Therefore, your kind participation in this study will be highly appreciated.

If you are interested and agree to take part in the study you will be requested to complete number of questionnaires related to demography, lifestyle modification practice and associated factors. It will take approximately 30 minutes to complete the questionnaire. You are free to ask any questions to researcher if you do not understand any question.

There are no direct financial or other benefits by taking part in the study. However, findings generated from the study will be useful in development of intervention program for management and control of blood pressure among the patients with hypertension. Further, there is no possible risk or harm associated with your participation in the study.

Participation is voluntary. You have the right to withdraw your participation at any time without any penalty and without having to inform the researcher. Your refusal to participate or withdrawal from the study will not affect your right to free healthcare services. The data collected from you will be kept highly confidential. Your name will not be reflected in the data collection form and instead a code number will be used. Once the data is punched on the statistical software, hard copy of the data will be securely kept under lock and key. Similarly, the soft file will be saved in password protected computer. No unauthorized personal will be accessible to the data except researcher and the major advisor. Findings of the study will be reported as a group of participants without disclosing information from individual participant. The data will be destroyed after publication of the result. You will receive deeper explanation on nature of the study upon its completion, if you wish.

The research study will be conducted by Mr. Nima Dorji under supervision of my major advisor Assistant Professor Dr. Niphawan Samartkit. Should you have any questions or clarification related to research please do contact me at 17544878 or by email dorji_405@yahoo.com. Or you may contact my major adviser via email: nsamartkit@gmail.com Your kind cooperation is highly appreciated.

Name of Researcher: Nima Dorji

PARTICIPANT'S CONSENT FORM

Title: "Factors influencing lifestyle modification among hypertensive patients in Bhutan".

IRB approval number (005/2020), REBH approval number (2020/024),

Date of data collection …….to…….,2020

I have read and understood the purpose, procedures, possible risk and benefits associated with my participation in the study. I was also given a copy of participant's information sheet and consent form. Therefore, I confirm my participation in the study by signing on this consent form.

I, Mr. Nima Dorji, a researcher in the study have provided each participant a copy of participant's information sheet which gives pertinent information related to study including the purpose, procedure, possible benefits and risks.

Signature of the participants ……Date…….....

Name of the researcher …….signature……..…….

Date……

APPENDIX E

Ethical clearance letter and data collection letters

COPY

Certificate Number 005/2020

Certificate of Human Research Approval
Burapha University

BUU Ethics Committee for Human Research has considered the following research protocol

Protocol Code : G-HS 009/2563
Protocol Title : Factors Influencing lifestyle modification Among hypertensive patients in Bhutan
Principal Investigator : Mr.Nima Dorji
Affiliation : Graduate Program of Faculty of Nursing

BUU Ethics Committee for Human Research has considered the following research protocol according to the ethical principles of human research in which the researchers respect human's right and honor, do not violate right and safety, and do no harms to the research participants.

Therefore, the research protocol is approved (See attached)

1. Form of Human Research Protocol Submission	Version 2 : 23 February 2020
2. Research Protocol	Version 2 : 23 February 2020
3. Participant Information Sheet	Version 2 : 23 February 2020
4. Informed Consent Form	Version 1 : 3 February 2020
5. Research Instruments	Version 1 : 3 February 2020
6. Others (if any)	Version - : -

Approval Date : 25 March 2020
Valid Date : 24 March 2021

Sign (Witawat Jangiam)
(Associate Professor Dr. Witawat Jangiam)
Chairperson
The Burapha University Institutional Review Board
Panel 1 (Clinic / Health Science / Science and Technology)

ROYAL GOVERNMENT OF BHUTAN
MINISTRY OF HEALTH
RESEARCH ETHICS BOARD OF HEALTH
THIMPHU : BHUTAN
P.O. BOX : 726

Ref. No. REBH/Approval/2020/024 Date: 4th April, 2020

REBH APPROVAL LETTER (valid through 4th April, 2021)

PI: Mr. Nima Dorji **Institute:** Faculty of Nursing, Burapha University, Thailand	**Study Title**: factors influencing lifestyle modification among hypertensive patients in Punakha Bhutan.
Co-Investigator(s): Dr. Niphawan Samartkit, Dr. Dr. Khemaradee Masingboon, **Proponent of the study: Individuals**	
Mode of Review: Initial Review : ✔ *Expedited Review*	
Date of continuing review: 4th April, 2021 Note: Please submit continuing review report along with application form AF/01/015/05 at least seven days before the date of continuing review. If the study is completed then please submit final report of the study.	
List of document(s) approved: Protocol : Approved Informed Consent Form (ICF) : Approved (ICF wavier) Tools (Questionnaire/forms/guides/etc) : Approved	
Conditions for Approval: 1. *This approval is granted for the scientific and ethical soundness of the study. The PI shall be responsible to seek all other clearances/approvals required by law/policy including permission from the study sites before conducting the study.* 2. *Report serious adverse events to REBH within 10 working days after the incident and unexpected events should be included in the continuing review report or the final report.* 3. *No biological material shall be used for other research purpose beyond which is specified in this protocol.* 4. *Any new research study with stored biological material from this study will need a new approval from the REBH before study begins.* 5. *Any changes to the proposal or to the attachments (informed consent and research tools such as forms) shall be approved by REBH before implementation.* 6. *Final report of the study shall be submitted to REBH at the end of the study for review and protocol file closure.*	

(Dr. Neyzang Wangmo)
Chairperson, REBH

For further information please contact: *REBH Secretary:* at *Tel: +975-2-322602* or email at msgumng@health.gov.bt or tashidema@health.gov.bt

Office of International Strategic Affairs
Faculty of Nursing, Burapha University
169 Longhad Bangsaen Rd., Chon Buri, THAILAND 20131
Tel : +66 38 102 808 Fax: +66 38 393 476

MHESI 8106/0318

April 2nd, 2020

Punakha District Hospital
Punakha District, Punakha
Bhutan

Subject: Asking permission for data collection to test the reliability of research instruments

Dear Chief Medical Officer of Punakha District Hospital

Mr. Nima Dorji is a master degree student of Faculty of Nursing, Burapha University, Thailand. Presently, he is in the process of conducting his master thesis entitled "*Factors influencing lifestyle modification among hypertensive patients in Bhutan*" under supervision of Assistant Professor Dr. Niphawan Samartkit.

In this regard, I am writing to ask your permission to allow Mr. Nima Dorji to collect data in order to test the reliability of research instruments from 30 hypertensive patients from NCDs clinic at Punakha District Hospital, Bhutan during the period of April 2nd – 9th, 2020. Participants will be asked to complete questionnaires on their own. Should you need further information of this research project, please contact Mr. Nima Dorji at dorji_405@yahoo.com.

Your kind cooperation for this matter will be highly appreciated.

Yours sincerely,

Pornchai Jullamate

Pornchai Jullamate, RN, PhD,
Assistant Professor & Dean
Faculty of Nursing, Burapha University
Chon Buri, 20131, THAILAND
E-mail: pornchai@buu.ac.th
Tel: 66 38 102 809
Fax: 66 38 393 476

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MHESI 8106/0317

April 2nd, 2020

Punakha District Hospital
Punakha District, Punakha
Bhutan

Subject: Asking permission for data collection

Dear Chief Medical Officer of Punakha District Hospital

Mr. Nima Dorji is a master degree student of Faculty of Nursing, Burapha University, Thailand. Presently, he is in the process of conducting his master thesis entitled "*Factors influencing lifestyle modification among hypertensive patients in Bhutan*" under supervision of Assistant Professor Dr. Niphawan Samartkit.

In this regard, I am writing to ask your permission to allow Mr. Nima Dorji to collect data from 108 hypertensive patients from NCDs clinic at Punakha District Hospital, Bhutan during the period of April 10th – May 10th, 2020. Participants will be asked to complete questionnaires on their own. Should you need further information of this research project, please contact Mr. Nima Dorji at dorji_405@yahoo.com.

Your kind cooperation for this matter will be highly appreciated.

Yours sincerely,

Pornchai Jullamate

Pornchai Jullamate, RN, PhD,
Assistant Professor & Dean
Faculty of Nursing, Burapha University
Chon Buri, 20131, THAILAND
E-mail: pornchai@buu.ac.th
Tel: 66 38 102 809 Fax: 66 38 393 476

To
Chief Medical Officer
Punakha District Hospital
Punakha Bhutan

Subject: Requesting permission to collect data for my master thesis

Respecting Sir,

I am Nima Dorji, a Master Degree Nursing student studying at Faculty of Nursing Burapha University, Thailand. As a part of requirement of the master degree, I am in the process of conducting research entitled " Factors influencing lifestyle modification among hypertensive patients in Bhutan".

Therefore, I humbly seek your kind permission to collect data. A copy of REBH approval letter letter issued by Ministry of Health, Royal Government of Bhutan is attested herewith for your kind reference.
I look forward for your kind endorsement please.

Thanking you
Yours faithfully

Nima Dorji
17544878
Email: dorji_405@yahoo.com

* approved
5/4/2020

BIOGRAPHY

NAME	Nima Dorji
DATE OF BIRTH	15 March 1984
PLACE OF BIRTH	Kalamti, Bardo, Zhemgang: Bhutan
PRESENT ADDRESS	Punakha District Hospital, Bhutan
POSITION HELD	2013-2015 Clinical Nurse IV, Jigme Dorji Wangchuck National Referral Hospital, Bhutan. 2016-2017 Clinical Nurse IV, Punakha District Hospital, Punakha: Bhutan. 2018 - Till date Clinical Nurse III, Punakha District Hospital, Punakha: Bhutan.
EDUCATION	2007 - 2011 Bachelor of Science in Nursing, Dayananda Sagar College of Nursing, Rajiv Gandhi University of Health Sciences, Bangalore, India. 2018 - 2020 Master of Nursing Science (International Program), Faculty of Nursing, Burapha University, Thailand.